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Facility Condition Assessment Survey

Student Manual

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Eppley Institute for Parks and Public Lands
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Student Manual

Asset Management Process
Facility Condition Assessment Survey

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Welcome!

Introduction to the Course

The Facility Condition Assessment Survey (FCAS) course is designed to provide students with the competencies to implement condition assessments at their individual park units by using both the Facility Management Software System (FMSS) and the Cost Estimating Software System (CESS).

Your instructor will teach you how to use the CESS program as well as reviewing functions in the FMSS, a software program that should already be familiar to you. The process of performing the Facility Condition Assessment Survey requires you to shift back and forth between these two software programs as well as to leave the computer and head out into the field to assess the condition of your park's assets.

Briefly, when you perform an FCAS, you will

1) review asset data in the FMSS,
2) go out into the field to conduct the condition assessment,
3) enter data from the condition assessment into the FMSS, and
4) use the CESS program to determine a cost for any corrective action.

Because you will use functions of the FMSS as well as the software program CESS, this course will begin by teaching the separate parts of the FCAS and then conclude by bringing these parts together into one FCAS work flow. Your instructor first will demonstrate the entire FCAS work flow, then teach you the components of the FCAS, and, finally, guide you through the FCAS work flow.

Introduction to the Student Manual

The organization of this manual underscores the importance of the various components of the FCAS. The first two chapters review fundamental concepts from the Asset Management Process (AMP)/FMSS course. The next three chapters present new information about why and how to perform specific elements of the FCAS, while the last chapter brings all these elements and concepts together into one work flow process.

The review chapters discuss the National Park Service's (NPS) Asset Management Process and the significance of assets in this system. This information is followed by a review of the important tools for performing a needs assessment as well as a brief outline of the basic organization and use of the FMSS.

Chapter Three presents an introduction to the FCAS, including its relevance for NPS maintenance personnel. Details about how to conduct condition assessment inspections are presented in Chapter Four, while the use of the CESS is presented in Chapter Five.

The sixth chapter in this manual integrates all the components from the previous five chapters into one Facility Condition Assessment Survey work flow. Chapter Six presents the Facility Condition Assessment Survey in separate steps. If you want more in-depth information on a particular step from this work flow, you may consult earlier chapters.

Student exercises are woven throughout the Student Manual, increasing the practical aspects of learning about condition assessments. A Resources section containing additional information pertinent to the FCAS is included at the end of this manual. The Student Manual concludes with practical exercises that will promote the transfer of your skills to your park unit; you should complete these post-class assignments within 30 days of concluding the FCAS course.

Finally, a word about the contents of the Student Manual: This manual is not a textbook, a user's manual, or a comprehensive authority on either the FCAS or the FMSS. The Student Manual has been designed to work in hand with the training course you are about to attend. While certain parts and content of the Student Manual are designed to reinforce and remind you of the skills taught to you throughout the course, there are many more detailed and thorough documents regarding the FCAS and the FMSS available to you at the following sites:

- **http://pfmd1.nps.gov /FMP/fmss/** This webpage provides links to the FMSS program, as well as InsideNPS and the FMP Helpdesk.
- **http://inside.nps.gov** For more detailed instructions on how to access InsideNPS, see the Resources section.

In each chapter you will find the following components: Chapter Purpose, Objectives, Key Terms, Topical Content, Student Exercises, and a Review of Key Points.

Chapter Purpose (or why each section is important)
Provides a summary of how the content in the chapter can be helpful to you as a part of your daily job.

Objectives
The objectives at the beginning of each chapter form a guide for learning. They identify the purpose for the chapter and summarize the information you should take away after you complete the chapter.

Key Terms
These are a listing of the key terms to look for as you review the course content. Each of the terms will be defined within the content of the chapter as well as in the glossary at the end of this manual. The key terms will be easily identified by the key symbol in the left margin.

Topical Content
Content is provided in each chapter and serves as the primary educational material. Some special things to look for include:

Boxes that contain case studies or other special information designed to help you understand important points.

The computer monitor icon highlights computer keystrokes needed to input data into the FMSS.

The notepad icon highlights information that should be written down and kept in a convenient place where you can refer to it after you return to your park. This icon generally indicates information about decisions that need to be made at the park level.

The caution sign indicates when you should be careful to pay particular attention to the content, as it will have an impact on your success after you return to your park unit.

The wrench indicates useful tools or tips that can be used within the software, including shortcuts or time-saving methods within the FMSS and CESS computer applications.

The globe with the mouse icon identifies Internet sites where you can find more information.

Student Exercises
Practice exercises have been developed to assist you through the course. These appear within the topical content of the Student Manual.

Review of Key Points
This section of each chapter provides you an opportunity to develop a list of the key points from each chapter. This information can then be utilized as a reminder of these key points after you return to your park and share the information with your co-workers.

To support the learning objectives of this course, the Student Manual provides examples and other information in the Resources section at the end of the manual.

Learning the Software Associated with Condition Assessments

Understanding computers and their associated software programs is an acquired skill. Unless you grew up using them, you have likely discovered that there is always a learning curve when you are faced with developing new computer skills. Learning computer programs like the FMSS or the CESS is a complex process, which means that the learning process is not easily broken down into separate parts. Remember, everyone else in this class is also learning this information for the first time, and your instructors were in the same place as you when they first learned this information. Be sure to utilize your instructor's knowledge during the class and after the class concludes.

As you confront your learning curve, you may find the following suggestions to be helpful:

- First, as with the development of any new skill, you must be committed to learning.
- Be open to what is being taught.
- Perseverance and a positive attitude will help you as you move through the class.
- Asking questions and practicing your new skills will help you learn this information quickly and thoroughly.
- You will eventually "get it," particularly if you try to discover the answers to your own questions.

"What is in it for me?"

Since the NPS as a whole is a dynamic organization that must constantly change and evolve to face new challenges, you may find that you are being asked to learn new software programs from a range of NPS disciplines every year or every few years. In the business environment of today, adapting to change is the norm rather than the exception. When you and your classmates learn the software programs associated with the FCAS, you are contributing positively to the demands of change from within and outside the NPS.

Chapter One

The Basics: Overview of the Asset Management Process

Introduction
Overview of the Asset Management Process
The Importance of Assets

INTRODUCTION

Chapter Purpose

This chapter provides a general introduction to the Asset Management Process (AMP), a key part of the NPS Facility Management Program. The AMP establishes a systematic and effective business-oriented process to create a Servicewide asset database using the Facility Management Software System (FMSS), reviewed in Chapter Two. In this course, time is spent reviewing the foundational knowledge of the AMP and the FMSS before the introduction of the Facility Condition Assessment Survey (FCAS).

Your park unit should be using both the AMP and the FMSS. As part of your job, you should already be familiar with asset-based systems of facility management.

Chapter Objectives

After completing this chapter, participants should be able to:

- List the steps of the AMP.
- Discuss the function for each of the seven components that make up the AMP.
- Provide a general definition of the AMP.
- Explain why the mission is at the center of the AMP graphic.
- Review the organization of NPS park unit assets by geographic location, explaining asset hierarchy and the need to create an accurate and verifiable asset inventory.
- Explain the benefits of an asset-based system of facility management.
- Explain the difference between location/assets and equipment/feature.

Key Terms

Key terms are listed here for informational purposes. Definitions for most terms are also found in the Student Manual glossary.

asset	equipment/feature
asset hierarchy	Facility Management Software System (FMSS)
Asset Management Process (AMP)	parent/child relationship
asset standard	

OVERVIEW OF THE ASSET MANAGEMENT PROCESS

The **Asset Management Process** (AMP) provides the basic building blocks for the condition assessment process. It is important to review the material covered in the Asset Management Process/Facility Management Software System (AMP/FMSS) course so you feel comfortable with both the process and the software before proceeding to learn the additional requirements for completion of condition assessments. These first two chapters of the *Facility Condition Assessment Survey Student Manual* represent a significantly shorter version of the materials presented in the introductory course. If a student requires more information than what is provided in this brief review, it is recommended that he or she refer to the *AMP/FMSS Student Manual* for more information.

This chapter will address the AMP model (Figure 1); this model illustrates a standard approach frequently used in the facility management industry. It also represents the primary steps required to properly maintain and account for NPS assets. When examining the AMP model, it is important to understand that the inner circles—mission and needs assessment—drive the entire model. Each aspect of the AMP must consider mission and needs assessment as primary issues, which is why each component in the outer circle touches the needs assessment and mission circles in the center of the model.

The AMP includes seven components:

- Mission
- Needs Assessment
- Inventory of Assets
- Work Identification
- Work Planning
- Work Performance
- Evaluation

Figure 1: The Asset Management Process

The components of the AMP are discussed briefly below.

Mission
It is important to remember that the mission and fundamental purpose of the NPS is located at the center of the AMP model because the mission outlines the basic rationale for the existence of each park. A strong familiarity with the NPS mission and the Organic Act—as well as your park's enabling legislation—will be invaluable as you work toward building strong business practices within your park unit.

Needs Assessment
The needs assessment is a structured process both for evaluating NPS assets in relation to the mission of the park and for determining a numeric rating of the assets' priorities. The needs assessment surrounds the mission in the AMP graphic and is a principle component in determining the priorities of a park unit in managing its "built," cultural, and natural resources. The needs assessment process involves two important tools—the Asset Priority Index (API) and the Facility Condition Index (FCI)—which will be discussed at the beginning of the next chapter.

Inventory of Assets
The asset inventory process records the inventory held within the park as well as the current condition of each item. Without an accurate, verifiable, and usable inventory of each NPS park unit, it is difficult to ensure that needs assessments and all maintenance work performed are accurate, effective, or properly planned to meet accountability requirements.

The inventory of assets accomplishes three things: it 1) quantifies the assets in a park unit ("How many do I have?"), it also 2) identifies the assets in terms of both their function (e.g., visitor center) and 3) their associated industry standard unit of measure (e.g., 20,000 square feet).

The asset inventory provides the foundation for effective maintenance management. Once all the assets are identified, they can be truly managed. To properly record assets, they must be clearly identified.

Work Identification
Work identification is the process of determining work tasks to be accomplished. Work tasks result when:

- An asset is not at its established standard
- There is a need to maintain cleanliness
- There is a need for something new
- There is a need to provide service
- A component needs to be replaced because it has reached the end of its life

Work Planning
Work planning is the process of analyzing individual work requests to develop work statements. It includes:

1. Developing work plans, work scope, corrective actions, etc.
2. Determining the need for engineering or compliance approvals
3. Estimating costs
4. Determining funding, resources, and priorities

Work Performance
Work performance is the process of scheduling, executing, and tracking work.

Evaluation
Evaluation is the final step in the AMP. The evaluation includes an analysis of planned versus accomplished work, a review of the work performed, and an update of the condition of the asset or equipment/feature, as well as a review of the work process.

THE IMPORTANCE OF ASSETS

This section reviews important concepts used in the **Facility Management Software System (FMSS)**, an asset-based facility management program.

In the FMSS, assets, features, and equipment are organized by geographic area rather than by a functional hierarchy. The geographic organization is also known as the asset hierarchy. The geographic organization of assets

- allows for consistency throughout the NPS,
- acknowledges real assets in real locations, and
- is effective because it is more likely that functional units will change through reorganization rather than through changes to the location of assets.

All of these reasons support the use of a geographically-based hierarchy for managing assets.

Assets are a key concept for working with the FMSS. An **asset** is real or personal property that the NPS desires to track and manage as a distinct entity. It may be a physical structure or a grouping of structures, land features, or other tangible property that has a specific service or function, such as a farm, cemetery, campground, marina, or sewage plant.

The industry standard is to treat rolling stock and other equipment as assets that need to be managed, tracked, and included in facility management operations. Thus, the term “asset” is also applied to moveable items, such as vehicles and equipment. However, by definition, in the FMSS these items are recorded as ”Equipment/Feature.”

The FMSS divides assets into two categories: Location/Assets, which are large and generally immovable, such as a trail or a building, and Equipment/Features, which are replaceable and/or moveable, such as a crane or a roof. Using the Equipment/Feature application allows you to enter more detailed information on a piece of equipment or a feature.

> The asset is what you manage; you do work on equipment or features.

In the FMSS, **equipment/feature** includes rolling stock and mechanical devices used as a part of an asset on which work is performed. These are distinct elements, components or separately identifiable parts of an asset on which work is performed or which creates an identifiable workload. Examples of these include signs, plumbing components, canal locks, trees, plaques, interior doors, and roof surface/coverings.

As features are identified it is important to distinguish which features need to be monitored. Some features should always be included because they require periodic attention. For example, all HVAC systems should be a part of the feature inventory because they require continual monitoring. NPS has determined which features, by asset type, are required to be tracked in order to accomplish Asset Life Cycle Management. Other features may not need an individual record, but may be grouped when they are the same type and installed at the same time. Windows are a good example, as they generally do not require much attention individually, but as a group would need to be replaced prior to the expiration of the life of the building. In the case that a window does require special attention, it can easily be added as a separate record to the feature list and to the inventory for that particular building. The condition of an asset is reported in terms of its features.

Asset standards and feature standards are the expected condition or degree of usefulness of a facility or equipment. They are both a required condition and a minimum acceptable condition beyond which the facility or equipment is deemed unsatisfactory. In other words, these standards are the recommended guidelines for determining if park assets and features meet acceptable quality levels.

> For example, if a park unit contains an Anasazi ruin, the asset standard calls for the ruin to be maintained “as is.” At the same time, the ruin should be stabilized against both visitor use and the elements, and it should be treated in such a manner as to prevent future deterioration. The asset standard would not allow for the ruin to be restored based on a “ruin” standard. Conversely, if a park unit has a visitor center in the same area as the ruin, and if maintenance personnel discovered it contained older, un-insulated bare copper electrical wiring, the asset standard would require the building to meet code standards. In this case, the wiring would have to be replaced to meet this asset standard.

These examples illustrate that asset standards and feature standards are connected to work identification, as they allow one to determine if an asset or feature meets an established standard (such as LCS documentation, GMP, or Trail Management Plan). If

an asset or feature does not meet these standards, this situation results in the creation of newly identified work to be performed. Likewise, future work can be identified by considering the life expectancy of an asset or feature's components. Once work has been identified through the process of comparing assets and features against set standards, the work can be planned and executed, and a change in the asset's status can be accomplished.

Asset Hierarchy

One of the first steps in the inventory process is to define the **asset hierarchy** for each park unit. This hierarchy is a geographical representation of the assets within the park, broken into distinct districts or areas that contain various assets. Park units should keep locations as simple as possible. Do not develop non-location entries in the FMSS—for example, do not enter a record and call it "buildings" and then try to use that one record to group all the buildings in a park unit. The exception to this rule is the Fleet category, which contains rolling stock that is not tied to a specific geographic location.

> **CAUTION** Be aware of the following system rule when entering information in the FMSS: Do not use general descriptors or header records—such as "Buildings," "Roads," or "Housing"—in the asset hierarchy.

Remember, the asset hierarchy is an organizational tool that allows information to be input quickly, efficiently, and accurately.

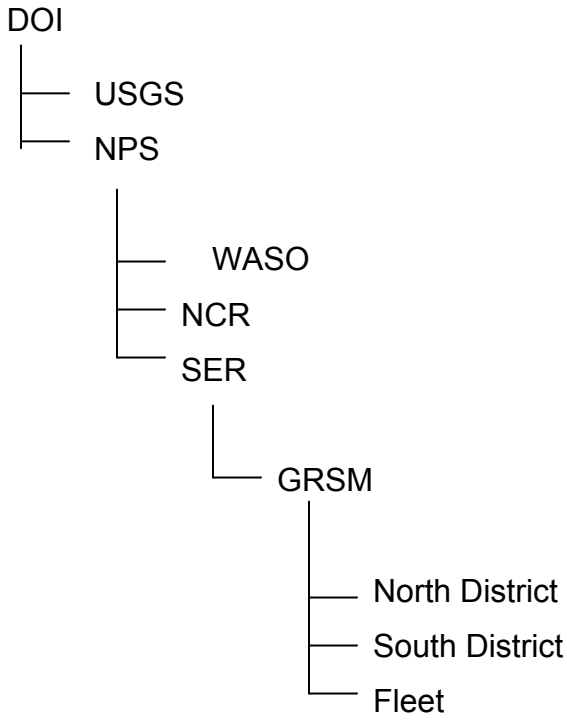


Figure 2: Asset Hierarchy

Figure 2 illustrates a basic Department of Interior NPS asset hierarchy in what is commonly referred to as a “drilldown” view.

Parents & Children

When working with the asset hierarchy in the FMSS, it is important to understand the concept of **parent/child relationships** between assets in a park unit. The easiest way to understand this concept is to think of the asset hierarchy as a family tree, where the parent is always one level above the child. Like most family trees, the asset hierarchy contains many levels of parents and children. For example, in Figure 3 below, the PW Region is the parent of the GREA,and the GREA is the parent of the Paradise Backcountry. As you will see, the parent/child relationships extend to equipment and features.

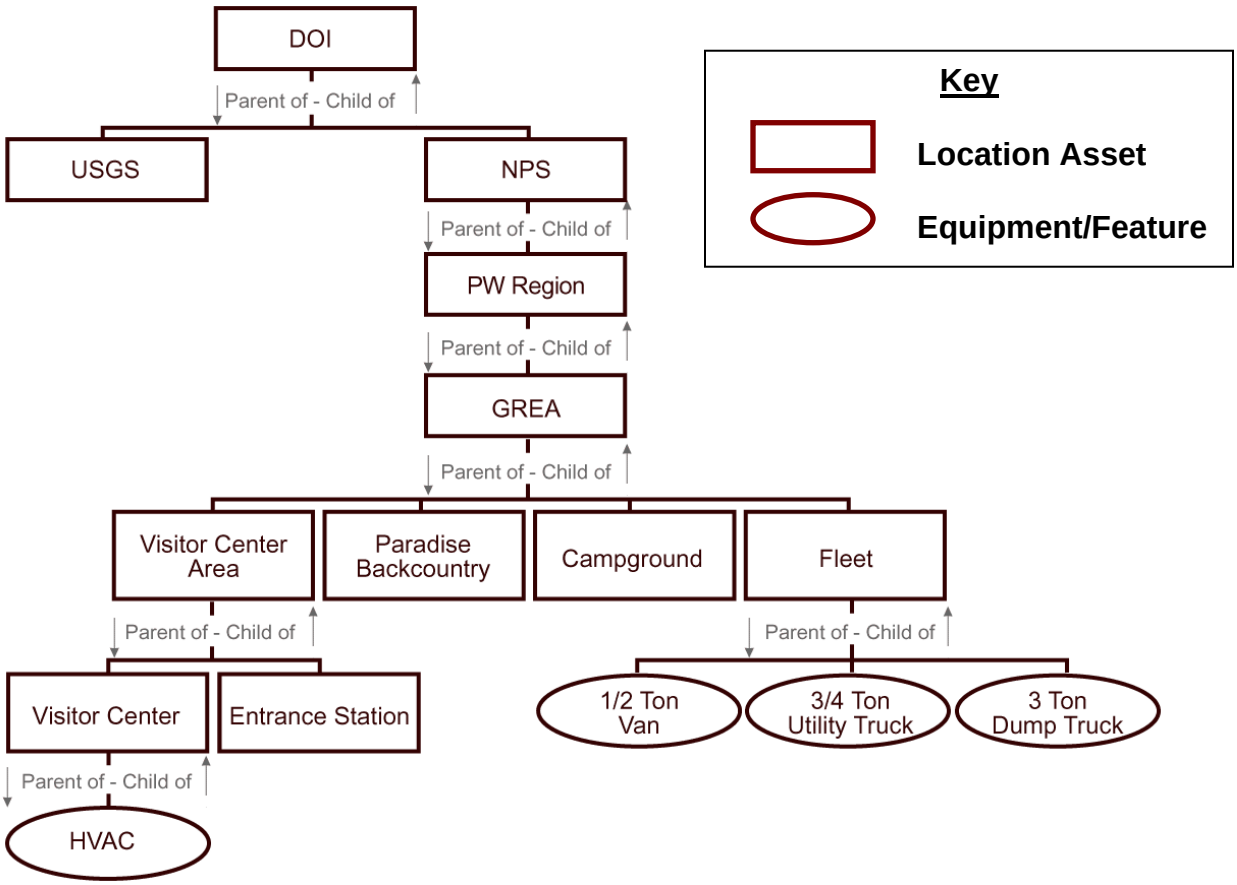


Figure 3: Parent/Child Relationships among Park Assets

Equipment/Feature Hierarchy

Equipment and features are organized in FMSS in the equipment/feature hierarchy, which is linked to the asset hierarchy. Consider the example below. The VC Visitor Center is the parent of the HVAC, which is, in turn, the parent of the Cooling Towers. The VC Visitor Center is part of the asset hierarchy. The HVAC and Cooling Towers are part of the equipment/feature hierarchy.

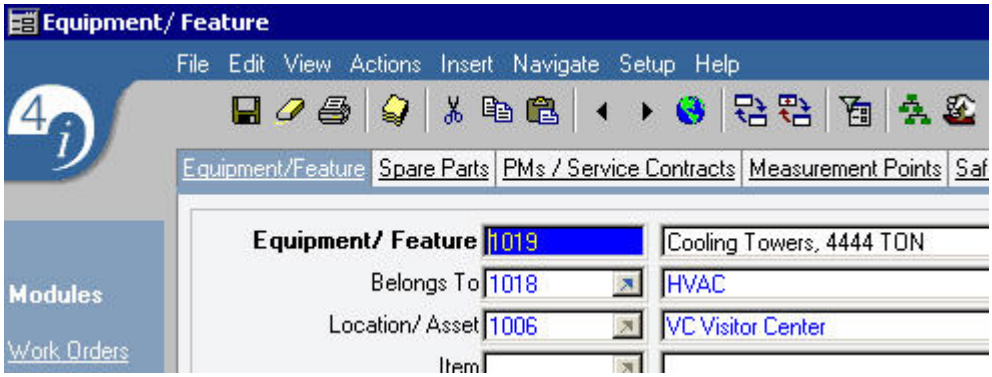


Figure 4: Parent/Child Relationships among Assets and Equipment/Features

Note that in an FMSS drilldown, the equipment/feature hierarchy appears on the Equipment tab of the Drilldown window.

Student Exercise: Parents and Children Practice

In small groups, discuss Figures 3 and 4 to determine the parent/child relationships listed below. Be prepared to share your results with the class.

Asset	Parent	Child
Visitor Center Area Pacific West Region HVAC Entrance Station		

Chapter One—Review of Key Points

- _____
- _____
- _____
- _____
- _____

Chapter Two

The Basics: Understanding Needs Assessment

Introduction
Setting Priorities: Needs Assessment
- **Asset Priority Index**
- **Facility Condition Index**
- **Current Replacement Value**

FMSS Basics

INTRODUCTION

Chapter Purpose

This chapter begins with an overview of the idea underlying the performance of needs assessments on park-unit assets by the NPS. Needs assessments help a park unit to set priorities for the performance of work on assets that are important to the mission of that park. Specific tools that help determine work priorities—the Asset Priority Index (API), the Facility Condition Index (FCI), and the Current Replacement Value (CRV)—are also discussed in this chapter.

In addition, this chapter presents a review of the basics of Facility Management Software System (FMSS), particularly as the FMSS relates to needs assessment and the Facility Condition Assessment Survey (FCAS). This review focuses on the Asset and Work Order modules of FMSS. It also includes a discussion of asset codes as well as the system rules for FMSS.

Chapter Objectives

After completing this chapter, participants should be able to:

- Explain the role of the needs assessment in the Asset Management Process.
- Identify the purpose and implementation of the Asset Priority Index.
- Identify the purpose and calculation of the Facility Condition Index.
- Discuss how stewardship is linked to needs assessment and priority setting.
- Demonstrate the ability to navigate through the basic components of FMSS.
- Complete a work order in FMSS.
- Identify the contents of a work order and how it authorizes or initiates work as well as documents actual work completed.

Key Terms

asset codes	Current Replacement Value (CRV)
Asset Priority Index (API)	Facility Condition Index (FCI)
auto number	needs assessment
corrective action	

SETTING PRIORITIES: NEEDS ASSESSMENT

The **needs assessment** is a structured process for evaluating NPS properties to determine a numeric rating reflecting an asset's significance in relation to the enabling legislation of the park. The following discussion of the needs assessment highlights its role in setting priorities for NPS facility managers as well as its connection to the Asset Management Process (AMP) through the Facility Condition Assessment Survey (FCAS). When determining the priorities of a park unit, the needs assessment is important because it aids in the management of a park's "built," cultural, and natural resources.

Director's Order 80 officially calls for the performance of needs assessments on NPS facilities. This Director's Order lists the needs assessment as a critical function of the NPS and states:

The NPS' intent is to construct, operate, and maintain facilities only in cases where those facilities are vital to meeting the mission of the national park area the facility is to serve.

Facilities are constructed, operated, and maintained only when:

- they provide the best protection or preservation of park resources
- they provide essential visitor services
- they support critical operations or functions in the park areas, or
- where the absence of those facilities would substantially decrease the ability of the Service to meet its mission.

To determine whether an asset is important to the mission of the park, a Needs Assessment should be performed every five years or sooner if regulations or a change in conditions warrant (Director's Order, 2004).

Director's Order 80 outlines how the NPS should be doing business, as well as what the NPS should track. Director's Order 80 links federal regulations and standards for facilities management to the mission of the NPS. It defines terms, establishes standard processes and protocols, and sets the stage for standardized management of park facilities throughout the NPS.

However, Director's Order 80 does much more than this. The true importance of Director's Order 80 is linked to the need for park managers and employees to understand the importance of sustainable, defensible, and quality facility management processes. This is needed since the mission of the NPS should be the ultimate deciding factor in how the NPS manages facilities that support park operations.

Director's Order 80 can help park employees ensure that decisions made about facilities at their individual parks reflect and enhance the mission of the NPS. After all, the facilities within National Parks are only important or appropriate when they serve to protect and preserve park resources and provide enhanced visitor experiences. Director's Order 80 provides the transition from general federal facilities regulations to the specific actions and practices that park personnel need to take to ensure that the park's facilities truly enhance the park's ability to meet its mission.

Visit **http://inside.nps.gov** to view a draft copy of Director's Order 80.

The interwoven relationship between the needs assessment (as supported by the FCAS) and the AMP is a critical concept that cannot be overemphasized. Without information obtained through the FCAS, the AMP model will not function and the facility management at each park will fail to focus on the important emphasis of needs assessment and park mission when determining maintenance priorities.

Needs Assessment Goals and Assumptions

The central goal of the needs assessment process is the creation of a method to determine the primary asset needs of each park unit based on that park's enabling legislation, management priorities, and condition.

Specifically, the needs assessment will:

- Establish and document a process for determining the status of assets
- Determine and document each asset's status
- Set asset prioritization within park

During the needs assessment component of a facility management program, NPS personnel rely on certain principles and assumptions to make accurate comparisons between assets. Three of these assumptions are listed below.

1) All park assets are listed in the FMSS database.
2) Some listed assets are not critical to the mission of the park but still accrue costs.
3) Those assets with an asset status of "excess" should be removed from the park because they are not necessary to meet the park mission.

Asset Priority Index (API)

The needs assessment process begins with completing **Asset Priority Index (API)** worksheets for the assets in your specific park. The API functions as a management tool that helps to determine the highest needs and priorities of a park unit. To be used effectively, and as intended by the Director and Congress, it is essential that a management team from a park unit complete APIs for each asset.

Determining the API

The needs assessment process begins with establishing a numeric rating—from 0 to 100—for each asset. This number reflects the status and "mission appropriateness" of each asset in a park. The numeric rating for each asset in the park is achieved through the completion of the API worksheet, which is available online. To determine an asset's API, an interdisciplinary management team should answer the questions in the API worksheet, which measures an asset's priority based on five criteria:

- Asset Status
- Resource Preservation (natural and cultural)
- Visitor Use
- Park Operations
- Asset Substitutability

The criteria are weighted, based on their importance to NPS core priorities: the NPS mission, park enabling legislation, and asset management goals such as those listed in Director's Order 80. This approach is known as a balanced scorecard.

The criteria are distinct to ensure that each aspect of the asset is measured independently. As a result, most assets will not rate high in all of them; only a few assets will have an API of 100.

The worksheet provides a clear definition and numerous examples for each criterion, to assist parks in choosing the correct rating for their assets. To further ensure accuracy and consistency, all park divisions should be involved in determining the API scores for a park's assets.

The API worksheet is web-based and linked to FMSS. For more information on the API Worksheet, log on to My Learning Manager and complete the API e-course.

Follow the link called Access to Other Databases, Asset Priority Index (API) worksheet on the FMSS log-in page to access the API worksheet. Once your park answers questions about an asset, the worksheet will calculate the API for you. After the superintendent approves the API, it will automatically be added to the asset's FMSS record.

It is important to understand that it would be a critical mistake for just one individual or one discipline to develop the API worksheet for a park. The park management team collectively completes the API worksheet for each asset in the park inventory.

As you prepare to fill out an API worksheet for a particular asset, keep in mind that while you must be familiar with the asset you are evaluating, a site visit to the asset is not necessary to complete the information on the API worksheet.

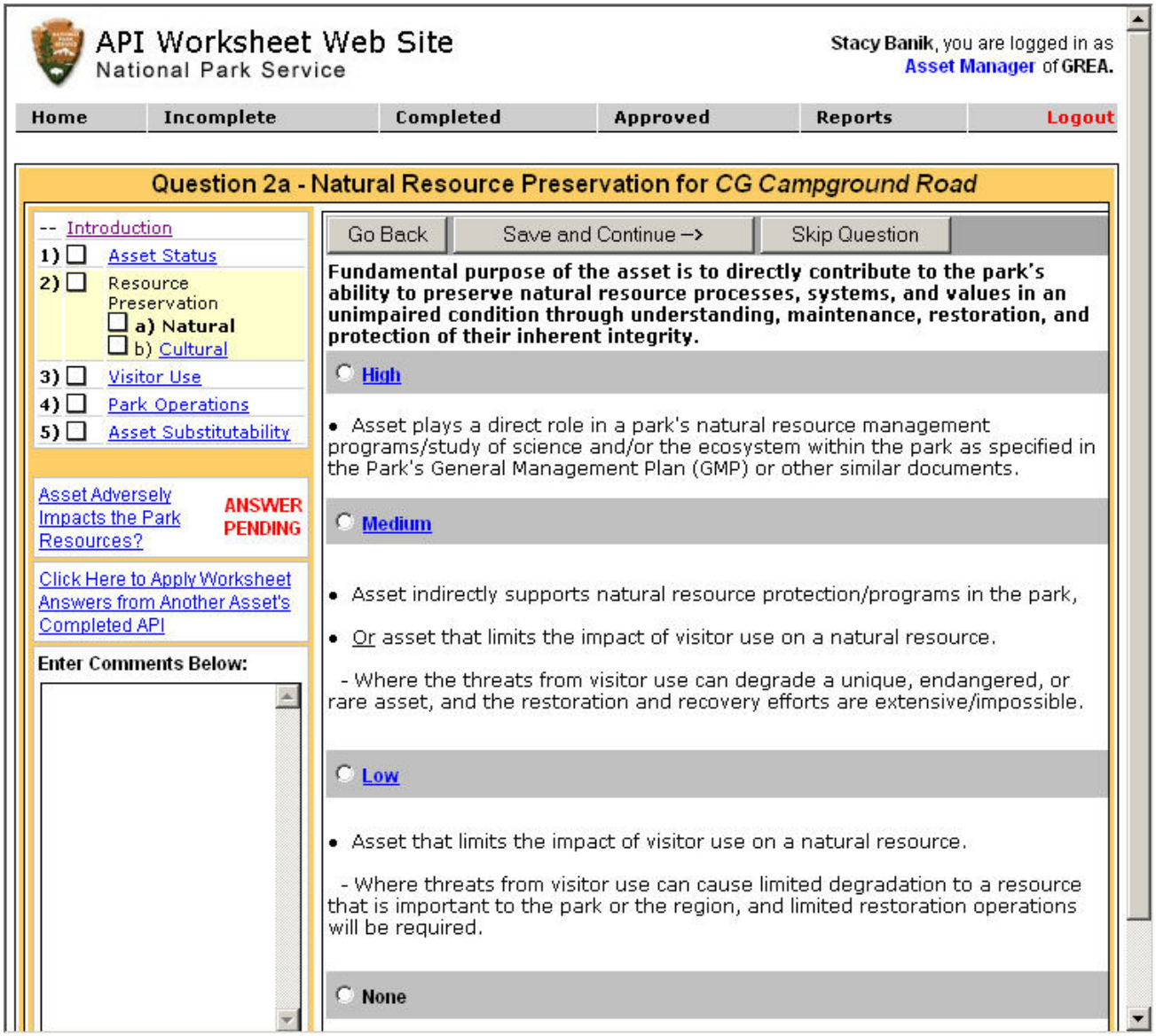

API Worksheet Web Site
National Park Service
Stacy Banik, you are logged in as
Asset Manager of GREA.
Home
Incomplete
Completed
Approved
Reports
Logout
Question 2a - Natural Resource Preservation for CG Campground Road
-- Introduction
1) Asset Status
2) Resource Preservation
a) Natural
b) Cultural
3) Visitor Use
4) Park Operations
5) Asset Substitutability
Asset Adversely Impacts the Park Resources?
ANSWER PENDING
Click Here to Apply Worksheet Answers from Another Asset's Completed API
Enter Comments Below:
Go Back
Save and Continue →
Skip Question
Fundamental purpose of the asset is to directly contribute to the park's ability to preserve natural resource processes, systems, and values in an unimpaired condition through understanding, maintenance, restoration, and protection of their inherent integrity.
High
• Asset plays a direct role in a park's natural resource management programs/study of science and/or the ecosystem within the park as specified in the Park's General Management Plan (GMP) or other similar documents.
Medium
• Asset indirectly supports natural resource protection/programs in the park,
• Or asset that limits the impact of visitor use on a natural resource.
- Where the threats from visitor use can degrade a unique, endangered, or rare asset, and the restoration and recovery efforts are extensive/impossible.
Low
• Asset that limits the impact of visitor use on a natural resource.
- Where threats from visitor use can cause limited degradation to a resource that is important to the park or the region, and limited restoration operations will be required.
None

Figure 5: The API Worksheet

The needs assessment component of the AMP—as put into practice by the API—ensures that assets are maintained according to priorities reflective of a park unit's mission. In the past, the NPS has mistakenly allocated resources to all assets, regardless of their API rating. This is clearly not the most effective way for us to manage our park units. Effective management means making good choices about which assets receive support from our limited resources. It may even mean removing assets that are considered excessive. The prerequisite for making these decisions is the knowledge of how assets are ranked, relative to each other, in terms of supporting a park unit's mission.

The API worksheet allows each park unit team to create priorities for asset maintenance and operations. Figure 6 represents asset need in relation to API score as a method of

prioritization. When looking at this graph, you can see where your assets fall in priority to each other. The question you should ask yourself regarding the asset in question is:

"According to the park's mission statement, is this asset

a. a high priority,
b. a moderate to low priority, or
c. not a priority?"

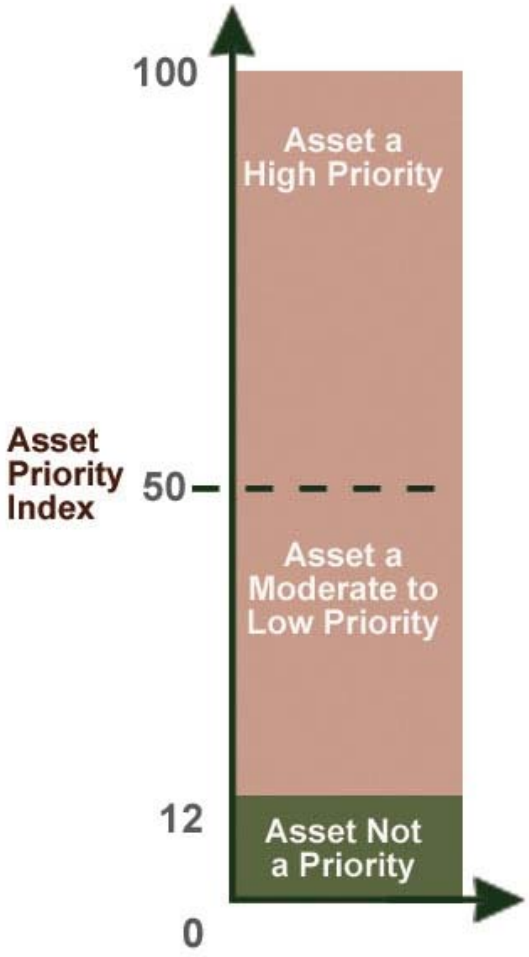


Figure 6: API Ratings and Needs Assessment Relationship

Determining the Facility Condition Index (FCI)

In addition to the API, the needs assessment process involves determining the **Facility Condition Index** (FCI). While the API is determined at the beginning of the needs assessment process, the FCI is determined at the end of this process from FMSS and CESS data. Knowing an asset's FCI will aid in work planning for that asset.

This simple measurement tool provides a "snapshot" of the relative condition of an asset or a facility at a particular point in time. The FCI utilizes a numeric rating system to rank the assets; this system relies on accurate data reflecting the asset's current replacement value and its projected costs of repairs.

Although the FMSS and CESS programs automatically calculate the FCI for you during the FCAS process, it is helpful to understand how this figure is calculated.

The Facility Condition Index is determined by dividing the collective value of all deferred maintenance for an asset by the current replacement value of that asset.

$$FCI = \frac{\text{Cost of Total Deferred Maintenance}}{\text{Current Replacement Value}} = \frac{DM + RMDM + CRDM + IPH}{CRV}$$

Total deferred maintenance cost includes the cost of deferred maintenance (DM), recurring maintenance deferred (RMDM), component renewal deferred (CRDM), and immediate personal hazard (IPH). These costs originate from the corrective actions identified in the FMSS and the derived costs from CESS. In the FMSS, total deferred maintenance cost is listed as Deferred Cost.

Corrective action is a breakdown of the best method for remediating a deficiency. Determining corrective action is the first step in the cost estimating process.

Current replacement value is based on *R.S. Means*®, an industry standard for cost estimating. Several studies have determined that *R.S. Means* should serve as the baseline of costs for construction work within the NPS. The *R.S. Means* cost data is a compilation of cost information that reflects a 30-city average across the United States.

NOTE: It is a good idea for your park unit to own copies of the *R.S. Means Cost Data* books. Though not required, it can be useful when completing cost estimates.

Remember, FCI is simply a relative indicator for Servicewide performance measurement. Facility managers should evaluate the changes over time in an asset's FCI to be able to monitor condition improvements and condition deterioration. This allows NPS to make requests for budgetary increases for sustaining facilities based on FCI data.

Current Replacement Value (CRV)

The **Current Replacement Value (CRV)** is derived by determining the current estimate for replacement of the asset in kind. CRVs are used for helping to calculate the FCI.

Because CRV is such an integral element of identifying work priorities, a CRV must be established for all assets, including heritage assets. Almost all heritage assets can be viewed as irreplaceable or priceless. However, while you can never replace the intrinsic value of a historic or heritage asset, you can, in fact, replace the "bricks and mortar" of a building.

The CRV is not to be used when budgeting for construction planning. For example, a park unit that is planning to build a new Visitor Center should not use the CRV found in the FMSS; rather, a more detailed estimate should be developed.

The NPS Current Replacement Value Calculator

For the latest copy of CRV calculator, go to http://inside.nps.gov/waso/custommenu.cfm?lv=4&prg=190&id=293. Click the link to the CRV calculator.

The CRV calculator tool provides a reasonably accurate (+50/-30 percent) replacement value for assets. To perform this calculation, the NPS employee needs to know the gross specifics and dimensions of the asset and its major features.

All calculations should begin and end in the Totals worksheet. The calculations from each tab appear in this worksheet. Before beginning a new calculation, the Totals worksheet should be cleared of any values. If old information appears on the Totals worksheet, select the worksheet that contains that data and delete any information from the quantity column only. Once your totals worksheet is clear, follow the instructions in the CRV calculator.

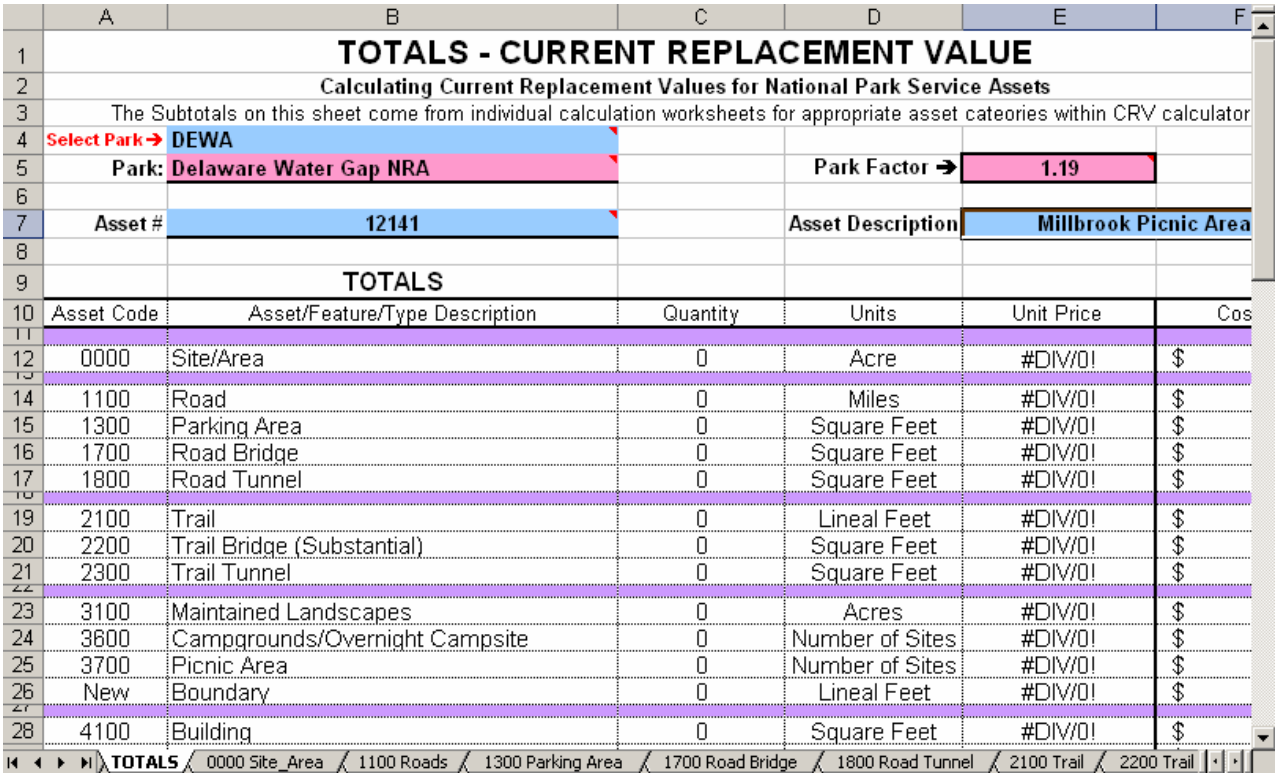
Since costs of construction vary greatly by location within the United States, the park factor (or park location factor) allows for the comparison of a specific park's cost of performing a construction or repair project to the national average cost. Park location factors take into consideration the cost of construction of the nearest commercial center (719 U.S. cities) to the park, the distance (remoteness) of the park to that commercial center, and the prevailing Davis Bacon Wage rates for the counties that the park lies within. This value indicates how much more (or less) expensive it will be to mobilize logistics for a construction or repair project at a specific park location than it would be compared to this 30-city average. Some of the larger parks may have more than one park location factor.

For example, the park location factor for the Grand Canyon South Rim is 1.08, while the North Rim of the Grand Canyon has a park location factor of 1.42. The current replacement value calculator automatically multiplies the current replacement value cost of a South Rim asset by 1.08 (8% more costly to replace than the 30-city average) while a North Rim asset would be multiplied by 1.42 (42% more costly to replace than the 30-city average). It is due to its remote location from construction resources that the North Rim's park location factor is much higher than the South Rim's.

Each asset type (e.g., trail, building, etc.) has its own worksheet, which can be accessed via the tabs at the bottom of the calculator. The CRVs created by the calculator are based on material and use. For example, asphalt trails and unpaved trails have different costs per square foot. The same is true for a picnic shelter and a visitor center. Once material and use have been determined, the dimensions of the asset need to be gathered. This data is specifically laid out in the spreadsheet of the current replacement value calculator.

Remember, the CRV calculations are gross square foot, acreage, unit, or lineal foot costs; in other words, these are simplified estimates. The formulas include averages for typical assets.

Do not include support utilities and structures (e.g., parking lots, external electrical systems, sidewalks, conduits, ramps, etc.) in the CRV calculation of an asset as these are not part of the asset. Conversely, in rare situations you will need to enter data in another worksheet as part of the cost of the asset that you are working on. You will be directed to do so each time this is required.



TOTALS - CURRENT REPLACEMENT VALUE

Calculating Current Replacement Values for National Park Service Assets

The Subtotals on this sheet come from individual calculation worksheets for appropriate asset cateories within CRV calculator

Select Park → DEWA

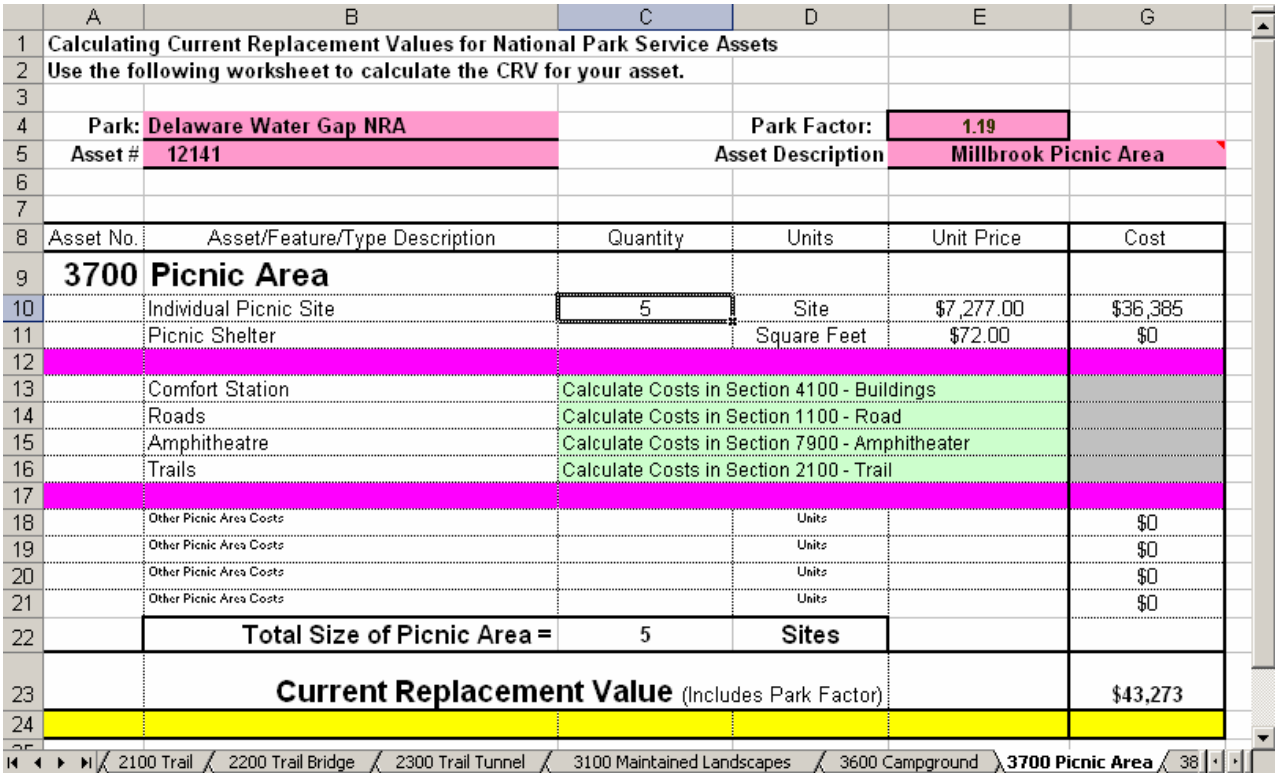
Park: Delaware Water Gap NRA — Park Factor → 1.19

Asset # 12141 — Asset Description: Millbrook Picnic Area

TOTALS

Asset Code	Asset/Feature/Type Description	Quantity	Units	Unit Price	Cos
0000	Site/Area	0	Acre	#DIV/0!	$
1100	Road	0	Miles	#DIV/0!	$
1300	Parking Area	0	Square Feet	#DIV/0!	$
1700	Road Bridge	0	Square Feet	#DIV/0!	$
1800	Road Tunnel	0	Square Feet	#DIV/0!	$
2100	Trail	0	Lineal Feet	#DIV/0!	$
2200	Trail Bridge (Substantial)	0	Square Feet	#DIV/0!	$
2300	Trail Tunnel	0	Square Feet	#DIV/0!	$
3100	Maintained Landscapes	0	Acres	#DIV/0!	$
3600	Campgrounds/Overnight Campsite	0	Number of Sites	#DIV/0!	$
3700	Picnic Area	0	Number of Sites	#DIV/0!	$
New	Boundary	0	Lineal Feet	#DIV/0!	$
4100	Building	0	Square Feet	#DIV/0!	$

TOTALS | 0000 Site_Area | 1100 Roads | 1300 Parking Area | 1700 Road Bridge | 1800 Road Tunnel | 2100 Trail | 2200 Trail



Calculating Current Replacement Values for National Park Service Assets

Use the following worksheet to calculate the CRV for your asset.

Park: Delaware Water Gap NRA — Park Factor: 1.19

Asset # 12141 — Asset Description: Millbrook Picnic Area

Asset No.	Asset/Feature/Type Description	Quantity	Units	Unit Price	Cost
3700	**Picnic Area**				
	Individual Picnic Site	5	Site	$7,277.00	$36,385
	Picnic Shelter		Square Feet	$72.00	$0
	Comfort Station	Calculate Costs in Section 4100 - Buildings			
	Roads	Calculate Costs in Section 1100 - Road			
	Amphitheatre	Calculate Costs in Section 7900 - Amphitheater			
	Trails	Calculate Costs in Section 2100 - Trail			
	Other Picnic Area Costs		Units		$0
	Other Picnic Area Costs		Units		$0
	Other Picnic Area Costs		Units		$0
	Other Picnic Area Costs		Units		$0
	Total Size of Picnic Area =	5	**Sites**		
	Current Replacement Value (Includes Park Factor)				$43,273

2100 Trail | 2200 Trail Bridge | 2300 Trail Tunnel | 3100 Maintained Landscapes | 3600 Campground | 3700 Picnic Area | 38

Figure 7: Current Replacement Value Calculation

Once a park has determined the FCI for an asset by dividing the collective value of all deficiencies for an asset by the CRV of that asset, you may compare the FCI for that asset against the following rating scale.

Facility Condition Index Rating Scale

FCI ≤ .100	Good condition rating
FCI is between .101 and .150	Fair condition rating
FCI is between .151 and .500	Poor condition rating
FCI > .500	Serious condition rating

- Non-heritage assets: Strongly consider demolition or replacement
- Heritage assets: Strongly consider stabilization/restoration

Essentially, the FCI is a representation of the condition of an asset or feature at the time a condition assessment is completed. The FCI rating scale presents a continuum from good to serious condition, as shown in Figure 8 below. (For instructional purposes, the figure is not to scale).

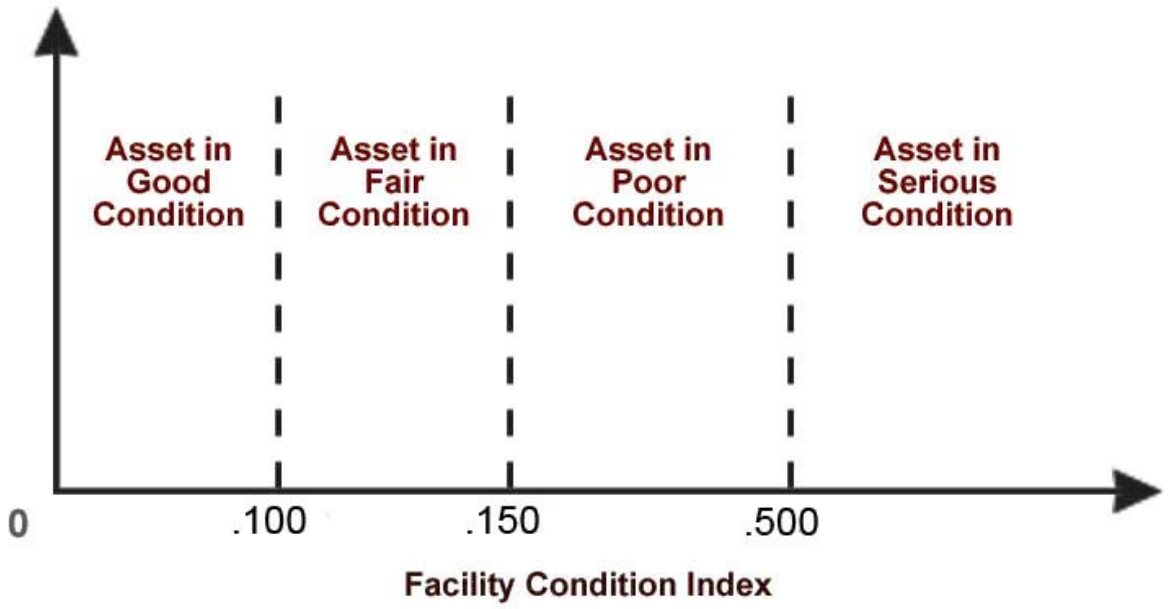


Figure 8: The FCI Rating Scale

The Relationship between the Asset Priority Index and the Facility Condition Index

The API and FCI work together to create a powerful tool that interprets both the priority and condition of an asset in relation to other assets within a park unit. This relationship provides facility managers with information that assists in prioritizing and identifying work at each park unit. By combining the graphic representations of the API and FCI, a potent tool is made available to the NPS. To review:

- The API, as previously defined, is an asset evaluation process that justifies the value of an asset in relation to the mission of the park. The API utilizes a numeric rating system that ranks assets.
- The FCI is a measurement of a facility's relative condition at a particular point in time. The FCI uses a numeric rating system that ranks assets based on a figure derived by dividing the cost of total deferred maintenance by the current replacement value of the asset.

The graphs presented in Figures 6 and 8, when combined, create a graph (Figure 9) that ties the concepts of need assessment and facility condition together to help determine the maintenance, repair and/or rehabilitation needed for each asset. The graph is really a tool that can help prioritize where park resources (time, money, staff, etc.) should be allocated for various assets within the park. The chart helps to reinforce industry standards for continuing preventive maintenance work on assets that are most important and in good condition, while, by degree, reducing resources that might be allocated to assets that are less important and in poor condition.

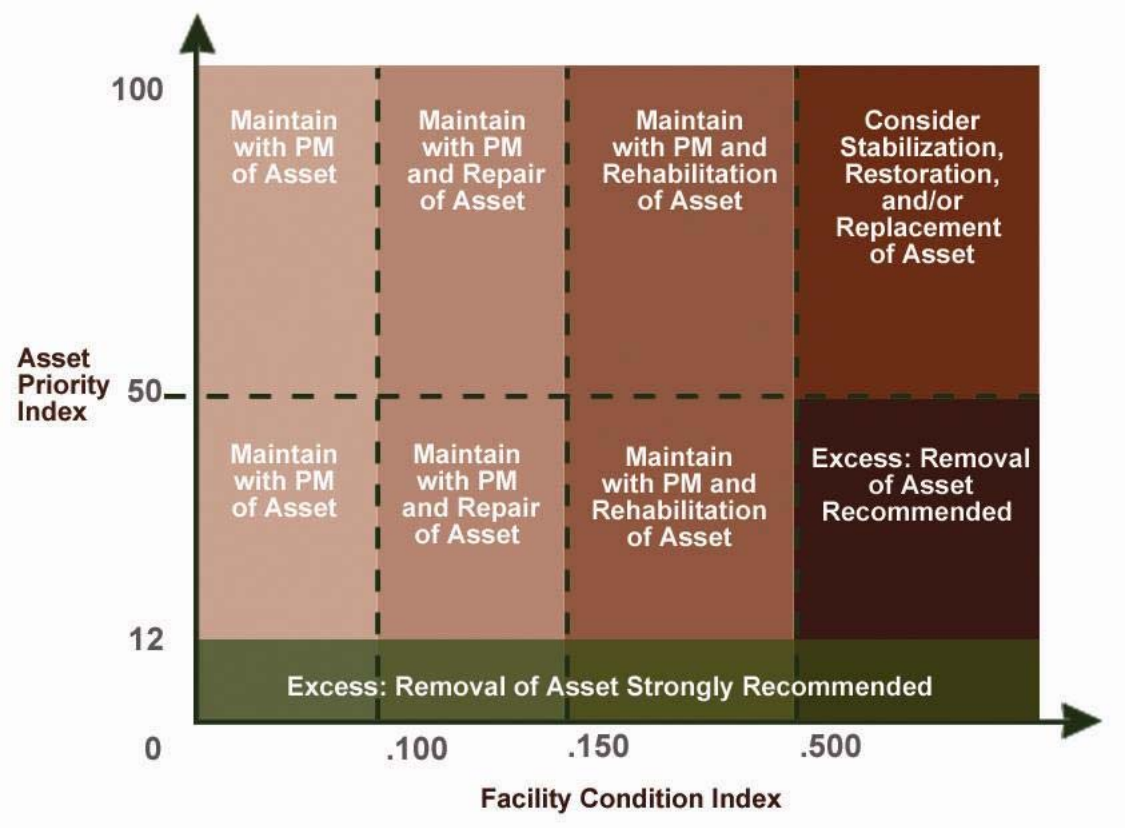


Figure 9: The Relationship between the API and the FCI

Parks use the API worksheet to determine each asset's API score. An asset's FCI will be available only after a condition assessment is performed.

Once both an asset's API and FCI scores are available, a park unit can locate the point at which these scores intersect. This intersection is a comparison of the relative priority of the asset and its condition. Park unit management should compare the API/FCI relationship among its various assets utilizing the guidelines found in Figure 10 to determine the appropriate action.

The graph on the following page is the official NPS API/FCI graph. This graph presents a combination of the API, FCI, asset condition, and maintenance level recommended.

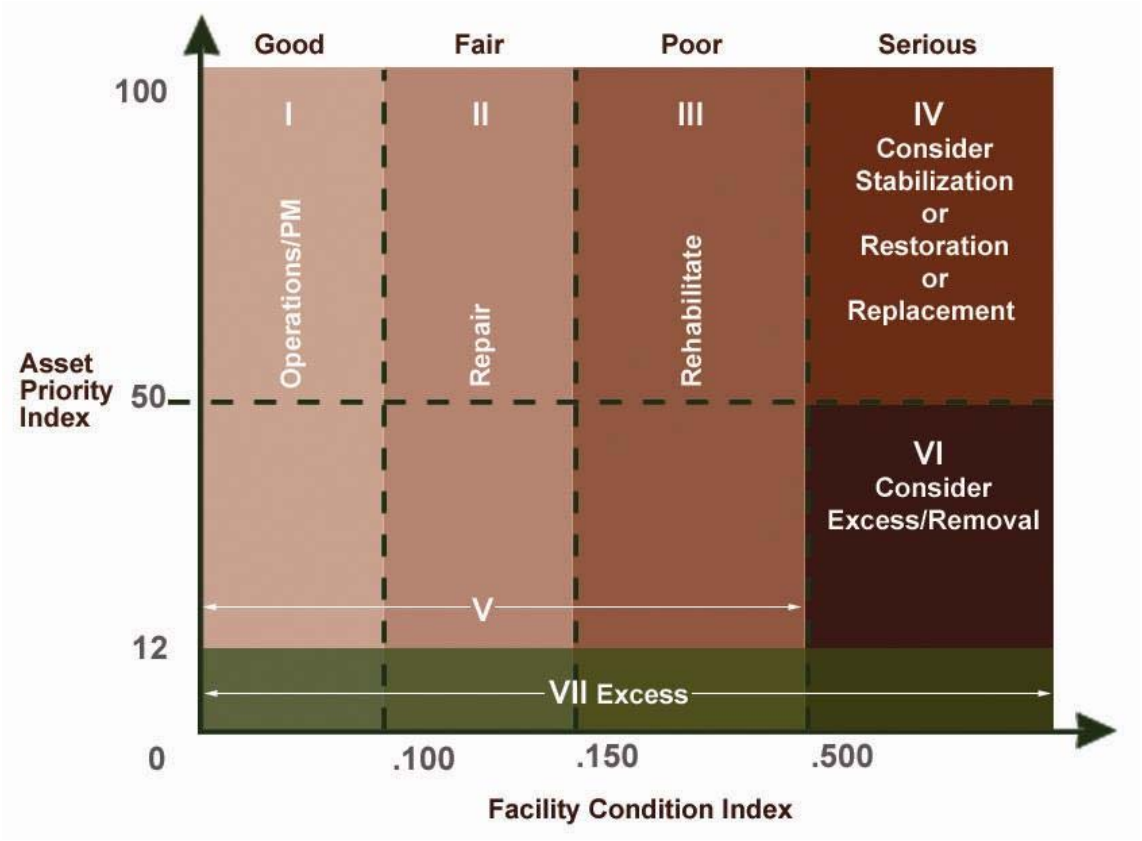


Figure 10: Official API/FCI graph

Steps for Completing Work Identification Using the API and FCI

In review, in order to determine the API/FCI relationship for an asset, the Park Management Team must collectively take the following six distinct steps, in order.

1. Determine each asset's API point value prior to condition assessment inspection.
2. Determine the CRV for the asset.
3. Determine the total collective deficiency cost estimates for each asset.
4. Determine the FCI by entering the data into the FMSS.
5. Compare the API/FCI relationship to determine appropriate action.
6. Prioritize work on all assets with relation to each other.

When combined, the AMP and the FMSS function as a powerful tool to identify and track the facility management decisions generated from this graph.

If a park unit evaluates a heritage asset and determines that it should be in Category VI or VII, "Consider Excess/Removal," be aware that such actions may require management consideration to make that determination, even if it is supported by the API/FCI graph.

Student Exercise: API/FCI Asset Charting Practice

Using the API/FCI charts, determine the recommended maintenance action for the following assets. Discuss your recommendation with the class.

Asset	Status	API	FCI
Trail	Operational	75	.4
Comfort Station	Operational/Obsolete	48	.7
Parking Lot	Operational	32	.07
Waste Water System	Operational	88	.12

FMSS BASICS

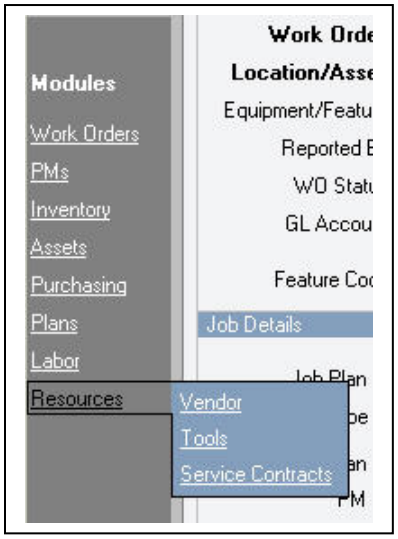
Navigation

Before reviewing the most commonly used elements in the Asset and Work Order modules, refresh your understanding of how to navigate within FMSS.

Modules

Modules are the large groupings of the major functions to the FMSS. You must click on a module to enter an application or hyperlink from another application. There are currently eight modules in the FMSS.

Applications are the subset of a module's functionality that either build the database or act upon it. When you move the cursor over a particular module (for example, Resources), the applications appear off to the right (Vendor, Tools, and Service Contracts).



Auto Numbering

Numbering is a required component with any type of database. The number that is assigned to a particular record within the database is there only to help with locating a particular record. Basically, it is a unique identifier that allows the software to keep records separate and organized. In the FMSS, the records are numbered for you.

If you enter ten items, you can only be assured that they will be numbered in such a way that the first record will have an auto number that is smaller than each of the remaining nine records. This occurs because the FMSS is part of a national database and the numbers are assigned in the order that the information is received in Washington. Auto numbering is required to maintain the integrity of the national database. Auto numbering will be used in all applications at the park level.

Assets: Obtaining Information

Queries are extremely helpful in finding existing records such as tools, equipment, labor, job plans and other pre-existing records in the FMSS. These records are often referred to or used as the basis for creating consistent but new records for the park unit.

One method of performing a query is to enter known information in one or more fields and then select the View List (globe) icon, resulting in a list containing the specific information you had originally entered.

Another method of performing a query is to right click on a selected field and, if it is available, choose "Select Value." Rather than scrolling through what may be a long list of values, use the "Filter By" dialogue box (at the bottom of the "Select Value" list) to narrow your search.

Since a query can return a large number of records, you can narrow your search by utilizing wildcard characters. Wildcards also allow users to search and query when specific records or data is unknown. Wildcards allow users to substitute a specific character for the value that is unknown and review a set of possible values for selection and use. Wildcard queries can be used in most fields. The two wildcard characters that you can use in the FMSS are the underscore (_) and the percent symbol (%). Consider the following examples.

_ **underscore** Takes the place of one and only one character

- For example: "Bldg 1_" returns a list of all buildings with a two character designation that begin with 1 (e.g., 1A, 12, etc.)

% percentage Takes the place of one character, many characters, or no characters

- For example: **"**smi%" returns a list of all individuals with last names that start "Smi" as in Smith or Smits
- For example: "%X%" (where X is a keyword in the work order description such as "roof" in "roof repair," or "road" as in "Spring Road Opening")

The placement of wildcard characters is important for locating the information you need. For example, "roof%" will produce results that include "roof repair," "%roof" will produce results that include "tile roof," and %roof% will produce results in which "roof" appears anywhere in the description.

Asset Codes

Asset codes are used by the NPS in the FCAS and FMSS. Within each general asset group (e.g., Grounds), there are asset categories (e.g., picnic area) with an associated code (e.g., 3700). The asset codes are established at the WASO level to provide Servicewide consistency in asset designation.

It is important to use asset codes uniformly, as this results in consistent data organization at all levels. This consistency ultimately assists with park, regional, and national reporting. In addition, uniformity with data organization will support Compliance with PL 98-540.

The table below lists specific assets and their associated codes.

FY2004 Asset Categories & Codes

Asset Group	Asset Category	Asset Code	Unit of Measure
SITE/AREA			
	Site/Area	0000	Each
ROAD, PARKING AREA, ROAD BRIDGE, ROAD TUNNEL			
	Road	1100	Miles
	Parking Area	1300	Square Feet
	Road Bridge	1700	Square Feet
	Road Tunnel	1800	Square Feet
TRAIL			
	Trail	2100	Lineal Feet
	Trail Bridge (Substantial)	2200	Square Feet
	Trail Tunnel (Substantial)	2300	Square Feet
GROUNDS			
	Maintained Landscapes	3100	Acres
	Campground/Overnight Campsite	3600	Number of Sites
	Picnic Area	3700	Number of Sites
	Boundary	3800	Lineal Feet
BUILDING			
	Building	4100	Square Feet
	Housing	4300	Square Feet

UTILITY			
	Water System	5100	Gallons per day
	Waste Water System	5200	Gallons per day
	Heating & Cooling Plant	5300	Each
	Electrical System	5400	Each
	Radio System	5500	Each
	Phone System	5510	Each
	IT System (i.e. LAN)	5520	Each
	Fuel System	5700	Each
	Solid Waste/Recycling System	5800	Cubic Yards
MARINE/WATERWAY/WATERFRONT			
	Dam/Levee/Dike	6100	Cubic Yards
	Constructed Waterway	6200	Miles
	Marina/Waterfront System	6300	LF of shoreline
AVIATION/ RAILROAD			
	Aviation System	6400	Square Feet
	Railroad System	6500	Lineal Feet
UNIQUE ASSETS (Not already covered in other Asset Codes)			
	Outdoor Sculptures/Monuments/Memorials/Large Interpretive Objects	7100	Each
	Ruins	7200	Square Feet
	Fortification	7300	Square Feet
	Towers/Missile Silos	7400	Each
	Amphitheaters	7900	Number of Seats
FLEET			
	Fleet	8999	Each
NO CODE			
	No Asset Code Available	9999	Each

Figure 11: Asset Codes

No Asset Code Available 9999
The "No Asset Code Available 9999" designation was developed as a method of capturing assets that do not appear to fit within an established asset code. In many cases, there is an appropriate category and code to select from, even for unusual assets. Frequently, features and/or equipment are incorrectly identified as an asset and entered into the "No Asset Code Available 9999." This code will allow the WASO office to identify if there is a need for a new asset code. For instance, as the Natural Resources discipline begins to utilize this program we may find that "Population" should be added as a new asset code to manage endangered species.

NOTE: If you are uncertain of which code to assign to an asset, contact the FMP HelpDesk.

Asset Module
Assets, features, and equipment are organized in the FMSS by geographic area rather than by function. The geographic hierarchy is an organizational tool that allows information to be entered quickly, efficiently, and accurately. The hierarchy of Location/Assets 1) allows for consistency throughout the NPS, 2) acknowledges real assets in real locations, and 3) works because it is more likely that functional units will change with reorganization than location will change. All of these reasons support the use of a geographically-based hierarchy.

The Assets module allows a user to view a hierarchy of all inventoried park assets. In navigating the FMSS, a user will often use the View Drilldown icon to view the parents and children of assets and equipment. Navigating the drilldown is closely related to entering locations/assets and equipment/features. Once you recall the navigation of the location hierarchy of locations/assets, you will naturally progress to an understanding of how to add locations/assets and equipment/features.

Work Orders
Work orders are a primary element of the FMSS. Work orders are used for planning work and resource needs. They track work performed and events that have occurred, ultimately providing information for evaluation.

Work Order Points to Remember

- Long descriptions can be added by a click on the detail button at the end of the description field.
- If long descriptions have been added, a red triangle (flag) will appear at the end of the description.

The Work Order module is an action application, meaning that it is an application that uses the information in the database to create documents.

Work Order Tracking Application
Work Order Tracking is the application used for planning, recording charges, and evaluating. Use the Work Order Tracking application to plan, review, and approve work orders for equipment and locations. When you create a work order in the FMSS, you initiate the maintenance process and create a historical record of work that is being performed.

- Work Order Plans Tab
  Standard or required steps needed to perform work orders—including planned labor resources, materials, and tools—are captured here. This information can come from the library established in the Job Plan or Condition Assessment Job Plan applications by identifying the Job Plan number on the main screen.

- Work Order Actuals Tab
  Time, materials, and tools actually used can be captured on this tab. This data is shared with the Labor Reporting application.

- Work Order Cost Tab
  This tab lists a summary of the details of current estimate costs, estimate at approval costs, and actual costs for a work order. This is where you can view a cost roll-up of a work order hierarchy. The Cost Tab is where you interface with the CESS database.

- Work Order Hierarchy Tab
  As with an asset hierarchy, work orders may fit into a hierarchical relationship of an umbrella or "parent" work order with subordinate or "child" work orders within the parent. An example of a parent/child work order hierarchy is presented below:

Parent WO:	Rehab Superintendent's house
Child WO:	Compliance
Child WO:	Asbestos removal contract
Child WO:	Gut and dispose (Carpenter Shop)
Child WO:	Sheetrock (Carpenter Shop)
Child WO:	Install new plumbing fixtures (Plumbing Shop)
Child WO:	Install new wiring (Electric Shop)

This organizational pattern helps to link related work orders necessary to accomplish a larger project or a more complex series of work.

A key to determining if a work order is a parent or child is to look at the Work Order Hierarchy tab in Work Order Tracking. This screen will display all work orders as either "belonging to" or "parent of" another work order in order to clarify the work order designation.

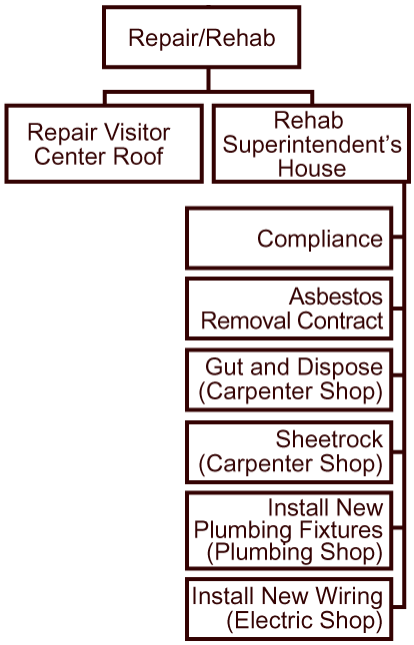


Figure 12: Sample Work Order Hierarchy

A work order hierarchy, which is organized according to the parent/child relationship, allows you simultaneously to keep the detail in each of your individual work orders and roll up the costs from each individual task to a project or management level. When a manager establishes a work order hierarchy for a project, he or she can evaluate an operation according to costs for labor, materials, or services by the individual tasks.

FMSS System Rules

The system rules for the FMSS identify standardized requirements for how to operate and use the software. When you implement and use the FMSS at your park unit, use the following system rules to establish consistency with FMSS data entry across the NPS.

- Required Fields are almost always indicated on the screen by **bold lettering**. These are also the fields that are needed for WASO reporting and to determine records for user restrictions. (For example, Park Alpha is a required field for every record in FMSS.)
- Blue highlighting of text in fields in the FMSS/MAXIMO™ screens indicates words or sections that *cannot* be modified by typing in that field. In some cases, you can change the blue highlighted text to gray by unapproving a work order.
- Gray highlighting of text indicates words or sections that *can* be modified.
- Storerooms must be used when planning work.
- Always use AutoNumber when inserting a new record.
- Enter your park unit as a vendor using AutoNumber.

- Use standard measurement units when entering information into the FMSS.
- Asset codes must be entered so that they are consistent with the WASO approved list.
- Signature Security must be applied consistently across all park units.
- All parks must be organized by asset hierarchy reflecting location so that data can be rolled up consistently throughout the NPS.
- Fleet must be a Location/Asset within every park unit's asset hierarchy.
- The only place you can use all upper case letters is in the Park Alpha field. Use upper and lower case letters as appropriate in all other fields.
- Craft codes are to be established in WASO only and are based on an employee's job series number.
- Major tools and equipment, such as backhoes or cranes, should be entered with a specific hourly operating rate based on a verifiable source. Small tools that are park owned, chlorine test kit, *may* be entered into the Tools application, but ***must*** be entered with a rate of $0.00/hour. These small, park-owned tools do not need to be tracked for cost, but should appear in the record as a reminder that they are needed for the job.
- You must use the Condition Assessment Job Plan as an inspection checklist when performing a condition assessment inspection.
- CA Job Plans cannot be changed or modified.

Chapter Two—Review of Key Points

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Chapter Three

Introduction to the Facility Condition Assessment Survey

Introduction
Stewardship of NPS Facilities and the Facility Condition Assessment Survey
Relationship of the Facility Condition Assessment Survey to the Asset Management Process

INTRODUCTION

Chapter Purpose

The Facility Condition Assessment Survey (FCAS)—the official term adopted by the Department of the Interior—is a practical component of the Asset Management Process (AMP) whereby facility managers periodically evaluate the condition of facilities to improve the effectiveness of maintenance and operation systems in the NPS.

This chapter introduces the "big picture" of the FCAS, including its relevance and importance for NPS facility management staff. Two major elements of the FCAS—condition assessment inspections and cost estimating—are discussed in depth in Chapters Four and Five. The last chapter in this course moves from this introduction of the "big picture" to the specific steps in the FCAS work flow.

Chapter Objectives

After completing this chapter, participants should be able to:

- Describe the various elements involved in determining the full cost of ownership for an asset.
- List the issues influencing funding levels for assets and the reasons for this under funding.
- Define maintenance backlog.
- Explain the purpose of the FCAS.
- List some of the benefits of completing FCAS.
- Explain the role that the AMP has in relation to the FCAS.

Key Terms

deferred maintenance
Facility Condition Assessment Survey (FCAS)
maintenance backlog
total cost of ownership

STEWARDSHIP OF NPS FACILITIES AND THE FACILITY CONDITION ASSESSMENT SURVEY (FCAS)

In the past decade, institutional facility owners have realized the value of the asset portfolios that they manage. This has elevated the position and skills required of facility managers. Rather than functioning as reactive managers of facilities—who are forever "putting out fires," so to speak—these individuals are now recognized as proactive stewards and facility managers of valued assets. As facility managers, they are required to maintain the value of their assets. Therefore, it is imperative that facility managers manage, report, and measure based on industry standard practices and performance measurement benchmarks.

Industry standards and benchmarks have been established by public and private organizations that have learned how best to maximize the use of the assets they own as well as how to sustain them over time through proper assessment and planning. Abiding by industry standards—established over time by the industry as a whole—saves the NPS from having to reinvent the wheel in its own management of assets across the Service.

Use of industry standard practices and performance measurement benchmarks legitimizes the management of NPS facilities because these standards and benchmarks have been proven successful and are recognized by government oversight agencies, such as the Office of Management and Budget, the General Accounting Office, and the Office of the Inspector General.

The **Facility Condition Assessment Survey** (FCAS, or shortened to "condition assessment") is a facility management tool used by industry leaders to track and monitor the condition of assets in an inventory. The FCAS touches on many aspects of the AMP and, in some ways, is a foundation for the effective use of the AMP.

Stewards of NPS facilities (including park unit facility managers) should understand how maintenance funding relates to the historic "under funding" of NPS units as well as how meeting industry standards can help secure maintenance funding.

Being a good steward of NPS assets also means recommending corrections to remediate asset deficiencies, with consideration of the "big picture" and not simply short-term corrections for long-term problems. Seeing the "big picture" requires you to consider the following issues:

- Life cycle of the asset—determine a reasonable life for the asset or asset feature before it needs to be repaired or replaced
- Current Replacement Value (CRV) for the asset
- The variety of options available with materials, tools, and equipment that can be used to remedy the deficiency
- Cultural and natural resources in the vicinity of an asset
- Sustainable design and materials

Caring for National Park Service Units

It is important to acknowledge and accept the **total cost of ownership** that comes with the oversight of federal facilities, such as those entrusted to the NPS. The total cost of ownership, as identified in *Stewardship of Federal Facilities* (Academy Press, 1994) includes the actions listed below.

Total Cost of Ownership Includes:	
Conceptual Planning	Rehabilitation/Alteration
Compliance Planning	Replacement
Design	Removal
Construction	Site Restoration
Maintenance and Repair	

Many factors influence the costs of NPS facility maintenance and repair, including the characteristics of an asset's design and construction, operating procedures, asset age, climate, and location.

NPS policies regarding the maintenance and repair of facilities ("built resources"), natural resources, and cultural resources have significant influence on the cost of ownership as well. Random events such as heavy storms, human error, or air pollution may also increase the need for maintenance and repair funding for specific assets at a park unit.

The complexity of each asset—as well as its size, current age, condition, and the nature of its exterior finish—will also influence the level of maintenance and repair activities required to prolong the life cycle of the facility. Other factors influencing the level of maintenance and repair required include:

- Telecommunications and security technologies
- Historic or community value
- Types of occupants or users
- Criticality of role or function
- Labor prices
- Energy prices
- Materials prices
- Distances between buildings in inventory
- Mechanical and electrical system technologies

Maintenance and Repair Funding Levels

Based on industry standards, NPS experience, and professional judgment, a general guideline for determining the appropriate annual level of maintenance and repair funding should be about 5 percent of the CRV of total assets inventoried. This figure refers only to the replacement cost—*not* a park unit's NPS operating funds.

Figure 13 shows the facility life cycle curve for an asset where adequate maintenance is not funded or executed, resulting in deferred maintenance that becomes asset deficiencies and results in a general decline of asset condition. Note that if an asset receives adequate maintenance and repair funding, which in turn results in the execution of maintenance services, the asset will remain in fair or good condition as shown in Figure 14.

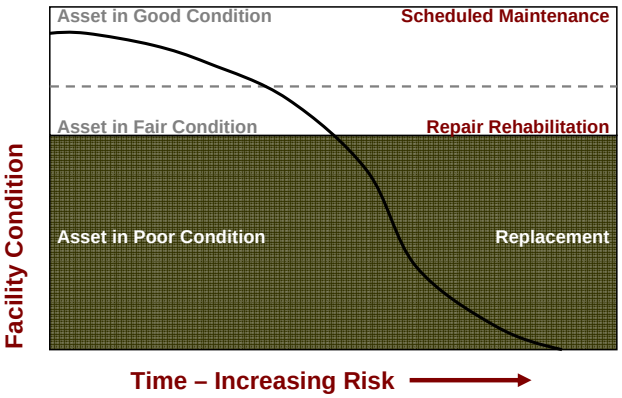

Figure 13: Facility Life Cycle Curve with No Maintenance Performed

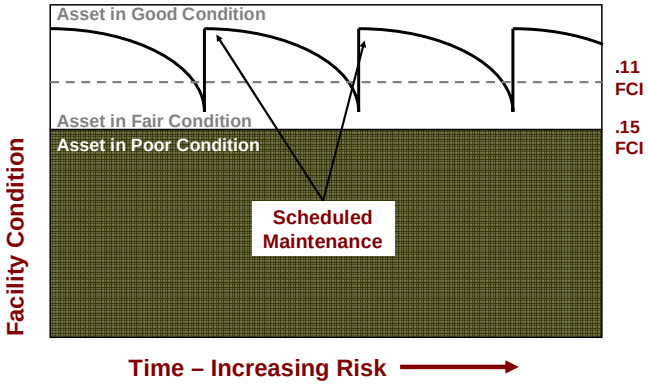

Figure 14: Effect of Scheduled Maintenance on Facility Life Cycle Curve

One of the motivations for the implementation of the FCAS across the NPS is to speed the process of reducing deferred maintenance Servicewide.

Deferred maintenance is action required to correct existing deficiencies that are a result of unaccomplished past maintenance, repairs, or replacements.

Acknowledging the NPS Maintenance Backlog

The NPS has a large **maintenance backlog** of projects that have not been addressed due to lack of funding, limited staffing, and other factors. Completing these deferred maintenance projects will cost billions of dollars.

Further asset deterioration is likely to occur in NPS park units if the backlog is not reduced. If this happens, the ultimate cost of correcting the deficiencies will increase exponentially. The funds required to correct deficiencies that will reduce the maintenance backlog are the next logical element to be included in the total maintenance and repair budget. These funds are often ignored by public agencies and are used to encourage expansion of assets without adequate maintenance funding.

To counter this trend toward increasing the backlog of maintenance deficiencies, the total effective budget for public agencies—including the NPS—must include:

- the routine costs of maintenance and repair, which are a continuing part of the cost of ownership, and
- additional funding to reduce any deferred maintenance or backlog, which is determined by the physical condition of the assets in inventory.

NOTE: Backlogs include deferred work. Even if the deferred work has been funded, it will still be considered a backlog because the work has not yet been completed.

Reducing the Maintenance Backlog

Several years of elevated funding and effort will be required to eliminate the maintenance backlog. An appropriate budget should be established to ensure the prompt reduction of the backlog. Repair spending must be adequate to outpace the continued growth of deferred maintenance tasks that occurs as a cumulative result of past neglect. No general valid rules of thumb can be recommended for determining funding, as this is largely dependent upon the findings of the condition assessment.

Parks have begun to address the maintenance backlog by conducting an FCAS on most of their assets. Now, as parks continue to conduct condition assessments, they will identify fewer new deferred maintenance deficiencies and will begin collecting information that will make it possible to anticipate and plan for the expense of replacing components. This process—known as component renewal or recapitalization—as well as other measures, will make the NPS less reactive and more proactive in its approach to maintenance.

Purpose of the FCAS

The FCAS—a key component of an effective maintenance and repair program in the facility management industry—is also the key component to identifying and validating the existence of a maintenance backlog in the NPS, and a key component in planning and preparing for long-term needs. The FCAS process allows for identification of deficiencies that need to be corrected and anticipation of components that will need to be replaced. It documents both the actions that need to be taken and the costs of these actions. A team of park unit staff is generally responsible for the condition assessment inspections and for developing accurate and verifiable cost estimates for recommended actions.

Various teams conduct these condition assessment inspections. These teams may include certified professionals such as architects and engineers; some teams contain NPS employees trained as facility inspectors. Each of these individuals works together to determine the physical condition and functional performance of a facility.

Benefits to Maintenance Staff of Using the FCAS

The FCAS was developed in response to an identified need to develop a systematic method of tracking and managing assets in the NPS. When assets are managed appropriately through the FCAS, the result is an accurate asset inventory that tracks past, present, and proposed future actions taken with a facility or resource.

The FCAS creates a sophisticated, accurate, and accountable system for the care of assets and resources. The establishment and facilitation of comprehensive preventive maintenance routines often results in a reduction in the unanticipated failures of equipment and facility systems and an increase in their life expectancy. In addition, the FCAS aids in developing sound and defensible budgets based on NPS goals and objectives, and increases the credibility of the NPS with the Office of Management and Budget and Congress in the areas of facilities maintenance, repair, and construction.

When completed, the FCAS forms the basis for the following maintenance actions:

1. Setting the annual maintenance and repair program.
2. Calculating funding needs for the maintenance and construction program.
3. Grouping individual identified actions into comprehensive repair, rehabilitation, or replacement projects.
4. Establishing priorities for the annual Five-Year Facilities Maintenance and Capital Improvement Plan.
5. Evaluating the change in a facility's condition and anticipating its future needs.
6. Reporting on deferred maintenance as required by the Federal Accounting Standards Advisory Boards Standard Number 6 (FASAB No.6).
7. Establishing and/or verifying asset inventory data.
8. Taking the initial steps towards creating an effective facility management program.

RELATIONSHIP OF THE FACILITY CONDITION ASSESSMENT SURVEY TO THE ASSET MANAGEMENT PROCESS

As mentioned earlier, the FCAS is actually an expansion of the AMP model, as it helps to perform an accurate needs assessment of a park's assets. Conducting the FCAS incorporates the following primary components of the AMP: needs assessment, inventory of assets, and work identification. Essentially, the FCAS process occurs within these three components of the AMP.

Figure 15 illustrates at what point the FCAS occurs in the AMP. As you can see, once a park has completed an inventory of its assets, the FCAS can be initiated. Once this process is complete, work is identified and the park facility managers can begin planning for the performance and evaluation of this work.

Figure 15: The FCAS Process in Relation to the AMP

The graphic above presents the FCAS as a generalized progression of steps. The specific steps of the FCAS, or the FCAS work flow, will be discussed in depth in Chapter Six.

If you would like more detailed information on the FCAS than is provided in this brief overview, consult the following facility management sources on the National Academy Press website (http://www.nap.edu):

- *Committing to the Cost of Ownership*
- *Stewardship of Federal Facilities*

Chapter Three—Review of Key Points

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Chapter Four

Condition Assessments

Introduction
Condition Assessment Overview
Roles of Key Personnel in Condition Assessments
Tasks in the Condition Assessment Process
Inspecting Assets

INTRODUCTION

Chapter Purpose

At the heart of the Facility Condition Assessment Survey (FCAS) is the condition assessment inspection. The condition assessment inspection is the portion of the FCAS that occurs in the field. The integrity of the FCAS relies upon the accurate and complete collection of deficiency information about an asset during this field component.

NPS employees do not need to be professional inspectors to perform the condition assessment inspection. However, a condition assessment inspector does need to be skilled enough with maintenance and repair issues related to the specific asset type to be able to determine the corrective actions for deficiencies identified in the inspection.

Chapter Objectives

After completing this chapter, participants should be able to:

- Discuss the difference between a Condition Assessment Annual (INCAA) and a Condition Assessment Comprehensive (INCAC).
- Understand the role class participants will play during a condition assessment at individual park units.
- Explain the broad tasks for completing condition assessments.
- Discuss the seven types of information that should be collected during a condition assessment.
- Describe a Condition Assessment Job Plan.
- Recognize what is or is not a deficiency.
- Describe the negative results of not gathering accurate deficiency and corrective action information when performing the condition assessment of an asset.

Key Terms

Condition Assessment Annual (INCAA)
Condition Assessment Comprehensive (INCAC)
Condition Assessment Job Plan (CA Plan)
corrective action
corrective action priority (critical, serious, minor)
cost estimate
deficiency
inspection guidance document

CONDITION ASSESSMENT OVERVIEW

Types of Condition Assessment
There are two types of condition assessment within the Facility Condition Assessment Survey (FCAS): the Condition Assessment Annual (INCAA) and the Condition Assessment Comprehensive (INCAC). Both of these types of condition assessments are important to the successful maintenance and repair of NPS parks, assets, facilities, and resources but they differ slightly in implementation, cost, and level of detail.

The **Condition Assessment Annual (INCAA)** focuses on the routine evaluation of NPS assets on an annual basis. The steps required to implement an INCAA are generally laid out in the following manner:

Step 1
- Identification and documentation of baseline asset inventory information
- Review of previously identified or noticeable deficiencies and the corrective actions taken
- Validation of the maintenance deficiency backlog previously identified

Step 2
- Adjustment of the corrective action and/or cost estimates of identified deficiencies

Step 3
- Completion of initial surveys for any newly acquired facilities and identification of recently developed deficiencies in all other assets

The INCAA is a walk-through assessment in which one looks for the obvious and apparent deficiencies. This type of assessment should *not* involve penetrating crawlspaces, where one might need to wear coveralls and use a flashlight in order to identify an asset's deficiencies. This process should also include the evaluation of Project Management Information System (PMIS) pending projects if an INCAA has not been completed.

The **Condition Assessment Comprehensive (INCAC)** is an in-depth physical examination of a park unit's constructed assets ("built resources") and landscapes. A multidisciplinary team of specialists—including architects, engineers, and facility inspectors—conduct the INCAC. The number of individuals and associated expertise making up this team will be dependent upon the complexity of the asset. The comprehensive condition assessment is to be completed approximately every three to five years. If conditions warrant or regulations require, a comprehensive assessment may occur more or less frequently.

After completing an INCAC, a contractor should produce a report that identifies and describes deficiencies, recommends corrective action, and provides cost estimates for all deficiencies. Also included in the INCAC is a complete listing of all facility code and standard violations, as well as facility conditions related to critical facility components and systems, such as structure, roofing, HVAC, plumbing, and fire safety. If the park lacks the expertise to do a necessary structural analysis, it should identify the need for further in-depth professional analysis. The narrative portion of the report must include recommendations for the corrective action. If the condition assessment is performed by a park team, the team should input this information directly into the FMSS.

Currently, the INCAA documents apparent and obvious deficiencies; however, when INCACs are completed, the INCAA becomes a validation of identified deficiencies and a documentation of new obvious deficiencies.

Facility managers should ensure that condition assessment work is integrated into their department's day-to-day routine by recording pertinent condition assessment information when work is performed on an asset. Doing so keeps the condition assessment information current and completes the Asset Management Process.

Condition Assessment Comparison Schedule

The Condition Assessment Annual is a basic management tool parks use to track the condition of assets **every year**. The Condition Assessment Comprehensive is a much more detailed review of park assets and is to be scheduled every **three to five years**. In the years when an INCAC is being conducted, the INCAA is not required.

The figure below illustrates one example of the frequency with which condition assessments might be performed at a park. In this example, representing a five-year period, INCACs were performed in years 1 and 6 while INCAAs were conducted in years 2, 3, 4, and 5.

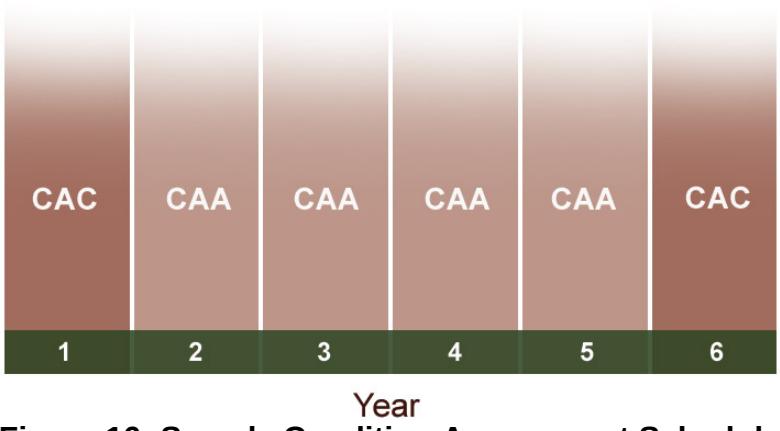


Figure 16: Sample Condition Assessment Schedule

Specialized Analysis

Occasionally, a specific system or component will require a more detailed performance evaluation over time. In this case, a Condition Assessment Comprehensive, which is a review of all asset systems and components, will include the need and cost for specialized analysis. The more defined solution for the condition is identified through the specialized analysis. A specialized analysis will ultimately create a detailed, specific, and more accurate solution to performance problems with an asset's systems and/or components. Clearly, the comprehensive condition assessment is required to be completed prior to undertaking a specialized analysis.

ROLES OF KEY PERSONNEL IN CONDITION ASSESSMENTS

An activity with the assigned budgetary and manpower resources of a condition assessment inspection needs to be planned and managed carefully. Solid preparation for and effective management of the FCAS produces impressive results that are invaluable to overall park unit management and facility management activities.

Dedicated teams—including maintenance staff, architects, engineers, facility inspectors, students, or trained NPS employees—can be used to conduct condition assessments. The condition assessment team should be provided with the number and complexity of assets to be assessed, anticipated or known problems, and the estimated time frame available to conduct an assessment.

An INCAC will involve all of the following individuals; however, an INCAA will likely require a smaller team of individuals to perform the condition assessments. To manage the FCAS effectively, each portion of the team has a clearly defined role, as detailed below:

Park Management Team

- Primary decision makers, charged with collectively completing the needs assessment for each asset in the form of an API, if not yet completed.

Chief of Maintenance/Facility Manager

- Learns and utilizes the FMSS and CESS programs
- Actively supports and promotes the FMSS and CESS programs
- Coordinates with the park management team to complete the needs assessment (API) for each asset
- Designates and empowers one employee to perform as the Logistics Site Coordinator for the condition assessment

Logistics Site Coordinator

- Learns and utilizes the FMSS and CESS programs
- Actively supports and promotes the FMSS and CESS programs
- Coordinates with other park disciplines to ensure access to all assets while conducting condition assessments
- Prepared to work non-standard hours (possibly 10 or more hours per day or seven days per week) during the assessment process
- Possesses knowledge of the area/location and history of each asset

- Knows whom to contact for technical or historical data
- Provides materials and equipment as needed

Park Facility Inspector

- Learns and utilizes the FMSS and CESS programs
- Actively supports and promotes the FMSS and CESS programs
- Prepared to work non-standard hours (possibly 10 or more hours per day or seven days per week) during the assessment process
- Possesses knowledge of the area/location and history of each asset

Regional Facility Inspector

- Learns and utilizes the FMSS and CESS programs
- Actively supports and promotes the FMSS and CESS programs
- Prepared to work non-standard hours (possibly 10 or more hours per day or seven days per week) during the assessment process
- Ensures the consistency of the application of the condition assessment process

Architectural and Engineering (A/E) Firms

- May be selected to conduct comprehensive condition assessments on complex assets (i.e., buildings, utility systems, etc.)

TASKS IN THE CONDITION ASSESSMENT PROCESS

The Importance of Being Prepared

Preparing for the condition assessment will require a significant time commitment from each park unit. Additional time will be needed to prepare for an INCAC, due to the need for consolidating historical park maintenance data as a baseline for completing facility inspections and the eventual inclusion of verified data into the FMSS or a data library. This data is also necessary to develop a scope of work if an Architectural and Engineering (A/E) firm is utilized to perform INCACs.

Obviously, condition assessments involve the commitment of significant personnel resources, either in the form of NPS park unit staff, facility inspection experts, and/or A/E firms. Condition assessments are similar to planning a large maintenance or capital project using in-house NPS labor. This means that the planning of field and office work at a park unit must be carried out in detail, in a timely manner, and in such a way that the management team and staff resources at the park unit are informed about their jobs and the expected timing of these jobs. Being prepared for a condition assessment inspection is essential if personnel and budgetary resources are to be used effectively and efficiently during the condition assessment. Following the completion of initial efforts to consolidate data into an easily retrievable format, future condition assessments will be less time consuming.

Preparing for subsequent condition assessments requires the park to run the WOCALD report in the work order tracking module to identify existing deficiency work orders. The

existing deficiencies should be reevaluated for accuracy and completeness and new deficiencies should be recorded.

> Being prepared will save time, save money, and increase the efficiency of the condition assessment process.

Condition Assessment Inspection Tasks
The condition assessment process can be broken into five general tasks:

1. Project Scheduling: Coordination of times and locations
2. Information Gathering: Preparation and search for data
3. Implementation: Inspections and the FCAS work flow
4. Data Entry: Using the FCAS work flow to document findings
5. Verifying the Data: Review the FCI and data for accuracy

Task 1 Project Scheduling

Before beginning the condition assessment process, park units should have their asset hierarchy entered into the FMSS, including an API worksheet completed for each asset. By evaluating the APIs of assets, park units should then be able to determine which assets have the highest priority in the park.

Once this information is established, each park must determine the most logical order for scheduling condition assessments. Smaller parks may want to schedule condition assessments starting with higher priority assets and proceed to lower priority assets. On the other hand, in order to best apply the time and resources of the condition assessment team, a larger park such as Grand Canyon may need to schedule condition assessments on all assets in an isolated area at one time. For example, it would make logistical sense to complete condition assessments for all Phantom Ranch assets during one trip to the area at the bottom of the canyon.

The use of A/E or facility inspectors may be necessary to support NPS park units in conducting condition assessments. It is, however, an activity that must be implemented effectively and scheduled in advance. In order to use these experts in an effective manner, parks should review the condition assessment process with the park unit managers, including the Superintendent. This will ensure that those managers who may be able to provide additional support or additional employees to help complete the condition assessment have an understanding and acceptance of the process. It is best to provide the park unit managers with a brief introduction to FMSS, CESS, the FCAS process, as well as the specific schedule for the condition assessment.

A pre-construction meeting is generally held before the launch of a contracted construction project. In the NPS, it is highly recommended to hold such a meeting to discuss the project's scope as well as inspector or A/E firm responsibilities, park responsibilities, and orientation of the inspection team to the park. By using maps, park brochures, and other specific park materials in the pre-condition assessment inspection meeting, along with brief tours of various sites within a park unit, park units can avoid confusion, delays and additional costs for inspections. It is helpful to use the associated Condition Assessment Job Plan during the pre-condition assessment inspection meeting, especially since it is a system rule to use this document as an inspection checklist when performing the on-site condition assessment inspection.

Task 2 Information Gathering

Condition assessment inspections *must* be carried out in field locations. As you begin the FCAS, you must validate and update any existing data by going into the field. Gather background data from a variety of sources "in the office," including the List of Classified Structures, the Cultural Landscape Inventory, Historic Preservation Plans, maintenance history, etc., before proceeding. In addition, each park unit is responsible for collecting and inputting baseline asset information into the Location/Asset record and its associated Asset Specification template in FMSS.

If park units are using a digital camera as part of this process, it is recommended that a minimum of one digital photograph be taken of each asset and its surroundings during the initial condition assessment inspection. Digital photographs can be utilized to supplement documentation of identified deficiencies. These digital photographs will be stored and should be easily retrievable in the Servicewide digital image library (under development), but they can be stored at each park unit for the time being.

A PowerPoint presentation about how to use digital cameras during the condition assessment is located on the *Facility Management Program Educational CD-ROM*.

Information Gathering for a Condition Assessment Comprehensive
When a condition assessment comprehensive is planned, a park should make extra efforts to gather all documents pertaining to its assets, including verified and updated data from existing condition assessments and building files. Of course, information gathered for an INCAA can also be applied to an INCAC.

The park unit should also collect all applicable existing drawings for assets to be assessed in a condition assessment comprehensive. Drawings should be organized by assets. If current drawings of buildings are not available, each park should draw a floor plan of the building for each floor. Include the locations of all windows, doors, built-in cabinetry, and appliances. Measure and document the dimensions of interior and exterior walls, windows, doors, and other features. Be sure to indicate the location and dimensions of any "hardscape" features such as adjacent sidewalks, decks/patios, or structures. Document the building length, width, eave, parapet, and ridge height on the floor plans.

Other informational documents that may be helpful with a condition assessment inspection might include energy usage data, if available. This data is required to conduct Level 1 energy audits. Park staff should gather data on all metered electrical, propane, water, and other energy services to park buildings for the previous two years. Data should be in Excel file format presenting the following information: Bldg #, Annual Consumption (kwh, gal, etc.), and annual cost, at a minimum.

In summary, when preparing for an INCAC, a park should gather or obtain the following items for each asset, if available:

- Building and equipment files and information
- Maps
- Building plans
- Drawings
- Trail maps
- GPS coordinates
- Manuals for specialized equipment and features, if any
- Site plans of grounds
- Energy reports
- Fire/safety reports
- Public Health Service documentation
- Structural analysis
- Prior condition assessments, if available
- Work space for inspectors and contractors with a phone line
- Necessary inspection tools such as ladders, binoculars, flashlights, coveralls, facemasks, etc.
- Building and gate keys

The following tasks involve use of the FMSS and CESS computer programs. Specific details about using these computer programs are presented in the last two chapters in this manual.

Task 3 Initiating the FCAS Process—From the Computer to the Field

Once all the appropriate information is collected and the assessment scheduled, the park unit can begin to complete the condition assessment. This process consists of preparatory work in the FMSS, followed by condition assessment field work.

A number of the preparatory steps must be done to initiate the condition assessment process in FMSS. The first is recognizing that condition assessments are done repetitively at varying times—which is basically the same as preventive maintenance activities.

The annual condition assessment, then, uses PMs as a starting point. This is followed by the requirements found in Condition Assessment Work Order—which lists the necessary steps and tasks required to complete inspection of an asset and its features.

Generation of a Condition Assessment Work Order is required *prior* to conducting the condition assessment inspections. This requirement standardizes inspections throughout the NPS by creating a work order and associated Condition Assessment Job Plan against which identified deficiencies can be reported for each asset.

From the Condition Assessment Work Order, run the report titled CAWOAPR2 to get a copy of the **Condition Assessment Job Plan (CA Plan)**, which produces a checklist that you can

use for both INCAAs and INCACs. A CA Plan defines the processes or steps involved in performing a condition assessment of an asset and its features.

You should also obtain an **inspection guidance document** for each type of asset being inspected. These documents supplement the CA plans and give your park additional assistance when conducting assessments. (The inspection guidance documents are available on the 2005 Educational CD and in the Asset Management section of InsideNPS http://inside.nps.gov.)

Condition Assessment Job Plans and inspection guidance documents are particularly important as they set the basic standards for a Servicewide level of consistency and systematic process of conducting condition assessments. The CA Plan standards are established at the WASO level in order to reinforce this Servicewide consistency for condition assessments.

NOTE: CA Plans cannot be changed or modified. This system rule helps maintain consistency through a unified standard of data entry Servicewide.

For any condition assessment, it is helpful to assemble an inspection kit consisting of such items as paper, pencil, tape measure, and a digital camera (if your park has decided to include this tool in the kit). The size and sophistication of the kit will differ from an INCAA to an INCAC.

Task 4 Data Entry—From the Field to the Computer

After the on-site condition assessment inspection has occurred, park units must enter deficiency information into FMSS. The follow-up work order(s) quantifies and records the deficiencies identified for each asset's features, and allow(s) the work type to be determined.

A work order is required in order to process **cost estimates** in the CESS and determine an FCI. A cost estimate is a compilation of the items needed, the material, labor and tool costs, to complete a deficiency remediation.

Task 5 Verifying the Data

After creating a cost estimate for the determined corrective action, it is important to verify that the cost data has been transferred from the CESS into the FMSS and that an FCI has been generated. Careful review of the FCI and CRV is necessary to ensure the accuracy of these estimated values.

INSPECTING ASSETS

In the previous section, which defined 5 tasks for completing condition assessments, Task 3 introduced the concept of actual field inspection of assets. The following general outline is intended to guide NPS personnel in consistently and efficiently inspecting assets.

NOTE: Students should remember to keep the same laptop throughout training.

In the Field: Conducting Inspections
Efficient and effective inspections require that any deficiency identified in an asset be documented at the time it is discovered, along with all the relevant data that is necessary to plan corrective actions, and estimate the costs of corrective action. Yet, the inspectors should avoid acquiring unnecessary and overly detailed information. The balancing of information gathering suggests that, at a minimum, the inspection documentation should include:

- WHERE the deficient feature is located in the asset
- WHAT the feature is (exterior door, chilled water pump, etc.)
- DETAILS on the feature (size, capacity, manufacture, model, etc.)
- WHY the corrective action is needed or what is deficient (broken, missing, worn, obsolete, etc.)
- CORRECTIVE ACTION (repair, replace, etc.) required
- QUANTITY of the deficient feature requiring correction using standard units of measure (include unit of measure used)
- WHEN does the deficiency need to be remedied (priority)

Step 1: Identify WHERE the deficient feature is located in the asset. Be specific. The goal is to be able—without a drawing or other guidance—to know the precise location of the deficiency by simply viewing the report. If the corrective action spans several locations, describe just that.

- Is it in room 101 or 101A? Does the corrective action recur across several rooms (e.g., in rooms 101, 101A and 105)?

- Does the corrective action occur in a specific location within a large area (e.g., in the southwest corner of the Hangar Bay #2)?

- If a corrective action, such as painting, is needed “throughout” the building (or floor, or room), then the corrective action must be throughout and not in various locations. Also, when using the term “throughout,” the item you are correcting should be the same. Be specific about where “throughout” is (e.g., throughout the building interior).

Step 2: Identify WHAT feature is being corrected. Is it a door, wall, ceiling, chilled water supply pump, condensate return unit, window, etc.?

Step 3: Give DETAILS on the feature. Include material types and sizes, and give details on capacities such as horsepower, voltage, and amperes. Familiarity with CESS is important before going out in the field. This will allow inspectors to better understand what data is required.

- Is it a steel door or is it an aluminum door? Is it a wood solid core door or is it a hollow core door?
- Is it 6'-8" X 3'-0" or some other size?
- Is it a concrete wall, a dry board wall, or a CMU wall? Is it painted?
- Is it a drywall ceiling or a 2' X 4' acoustical mineral fiber suspended ceiling?
- Is it a 5, 10, 25, or 50 horsepower, base mounted, 3 phase, 480 volt pump?
- Is it a single or duplex condensate return unit with an integral or external tank?

This information is critical. It is extremely hard to prepare cost estimates and work orders without this detailed information.

Step 4: Justify WHY the deficiency needs to be corrected. Be brief and to the point, using descriptive verbs that detail the nature of the deficiency.

- Is the feature broken, peeling, cracked, split, torn, corroded (surface), corroded with loss of base metal, weathered, missing, obsolete, outdated, bent, stained, etc.?

NOTE: Do not use words that are too broad, such as "damaged". If the feature is damaged, then detail what kind of damage has occurred. Be specific about why there is a need for a corrective action. Remember, this information justifies the need to correct the deficiency.

Step 5: Determine the Proper CORRECTIVE ACTION that is needed to remedy the deficiency (e.g., repair, replace, prepare and paint, clean, etc.).

Step 6: Identify HOW MUCH or QUANTITY. Inspectors must measure and quantify the materials needed for the corrective actions. Use standard units of measure. This is critical to preparing cost estimates and work orders. Inspectors must be familiar with the CESS database to ensure data is collected for the appropriate quantities.

For example,

- Square feet (SF) of 4" x 4" ceramic tile
- Lineal Feet (LF) of 10" PVC pipeline

Step 7: Identify WHEN the deficiency needs to be remedied by giving the corrective action a **PRIORITY**, by noting when the correction needs to occur. Below are guidelines used to assign corrective action priorities.

> CAUTION When working with deferred maintenance, select one of the corrective action priorities: critical (9), serious (5), or minor (1).

DEFICIENCIES

During a condition assessment, you must determine what type of work is required for each deficiency that is found. Routinely, the work-type chosen will be Deferred Maintenance. A **deficiency** is a defect in a facility that occurs when maintenance and repair tasks are not performed in a timely manner, or may result from changes to code. Deficiencies may not have immediately observable physical consequences; however, when allowed to accumulate uncorrected, they inevitably lead to deterioration of performance, loss of asset value, or both. An accumulation of such uncorrected deficiencies is a backlog that represents a liability for an asset (in both physical and financial terms).

The work required to correct deficiencies can be divided into categories, which are referred to in FMSS as sub-work types. The most common are defined below.

Component renewal (recapitalization) is the planned replacement of an asset's components that, according to condition and life cycle analyses, have reached or will reach the end of their useful lives within the asset's lifetime.

Deferred maintenance is action required to correct existing deficiencies that are a result of unaccomplished past maintenance, repairs, or replacements.

Component renewal work that has been tracked in the system becomes **Component Renewal Deferred Maintenance** if it is not funded when required. This sub-work type allows for long-term business practices to be documented and reported.

Recurring Maintenance is a work activity that recurs, based on normal wear patterns, on a periodic cycle of greater than one year and generally less than 10 years. Typical work includes painting, caulking, sealing, carpet replacements, etc. A few RM activities may have cycles of greater than 10 years, such as repointing of bricks.

Recurring maintenance that has been tracked in the system becomes **Recurring Maintenance Deferred Maintenance** if it is not funded when required. This sub-work type allows for long-term business practices to be documented and reported.

All of these sub types fall under the category of Facility Maintenance, which is itself one of three main work types. The other two main work types are Capital Improvements and Facility Operations. The work type and sub type fields are required to be completed, to identify this difference between deficiencies and to allow parks to capture all necessary work.

Determining Corrective Action

The person or team completing the inspections must have the skills necessary to accurately identify deficiencies, as well as the ability to determine the best corrective actions to repair the deficiencies. Use knowledgeable staff who can record what the appropriate remedy is for the repair.

> For example, one employee sent to review a building sees a stain on the wall and records the stain and that the wall needs to be painted. A more knowledgeable employee can see that the real problem is a water leak from a pipe above the ceiling and that the leak needs to be repaired and drywall replaced before the area is repainted.

Record the complete information needed to cost out the project; if inspectors record only very basic information during inspection, the park will not have enough data to correctly cost out the remedy. The following scenarios illustrate the importance of collecting enough information to be useful.

> Chris, a condition assessment inspector, recorded that there was a deficiency identified during a building inspection. After returning to the office, Chris did not have time to cost out the project for a day or two. Finally getting around to it, Chris remembers that two rooms in the building need painting but cannot remember the square footage of the area that needs painting. Also, Chris did not note the painting area for the several windows in the room that also need painting.
>
> Another condition assessment inspector, A.J., records that 100 feet of trail have washed out. However, A.J. did not record that the remedy needs to include installation of twenty water bars or that the wash out is located five miles from the trailhead so extra labor costs will be needed.

Without these details, the cost estimates will be difficult to complete accurately, even at a generalized level. During the inspection, be sure to gather all the information needed to

avoid having to re-inspect an asset in order to acquire data that should have been collected during the initial inspection.

At the same time, do not go to the other extreme by gathering information that is not needed to develop a general estimate. For example, you do not need to record the exact nail size needed for a project. This type of cost is already calculated by the CESS program at a level that is acceptable for a generalized estimate.

Corrective Action Priorities

Once you determine the corrective action, you must decide whether the **corrective action priority** is critical, serious, or minor. Use the following definitions in determining a priority. Record the level in the condition assessment work order when it has been determined.

Critical (9)—Exists when there is advanced deterioration which has resulted in the failure of the feature or will result in the failure of the feature if not corrected, when there is accelerated deterioration of adjacent or related materials as a result of the feature's deficiency, when there is a threat to the health and/or safety of the user, or when there is a failure to meet a legislated requirement.

- *An example of a critical priority is a leaking or failed roof.*

Serious (5)—Exists when there is a deterioration which, if not corrected, will result in the failure of the feature, when there is a threat to the health and/or safety of the user that may occur if the deterioration is not corrected, or when there is a deterioration of adjacent or related materials and/or systems as a result of the feature's deficiency.

- *An example of a serious priority would be extensive damage such as spalling, blistering, or cracking on a roof.*

Minor (1)—Exists when standard preventive maintenance practices and conservation methods have not been followed, when there is a reduced life expectancy of affected or related materials and/or systems, or when there is a condition with long-term impact.

- *An example of a minor priority would be missing a paint cycle.*

Chapter Four—Review of Key Points

- _____
- _____
- _____
- _____
- _____

Chapter Five

Cost Estimating

Introduction
The Fundamentals of Cost Estimating
Deficiency Remediation—More Practice
The Cost Estimating Tool: Introduction to CESS
Estimating Factors for the National Park Service
Using CESS: The Cost Estimating Process
Advanced CESS Topics

INTRODUCTION

Chapter Purpose

This chapter is designed to provide an introduction to the basics of cost estimating. The actual step-by-step process of using the Cost Estimating Software System (CESS) is presented in Chapter Six as part of the Facility Condition Assessment Survey (FCAS) work flow. CESS is used for the preparation of cost estimates that remedy asset deficiencies found during the condition assessment process.

Chapter Objectives

After completing this chapter, participants should be able to:

- Discuss the importance of accuracy and consistency when preparing cost estimates
- Discuss a Class C estimate and explain why NPS is using Class C estimates for the Facility Condition Assessment Survey
- Explain key terms associated with cost estimating
- Navigate within the CESS program
- Perform an Assembly Takeoff, an Item Takeoff, and a Quick Takeoff
- Discuss the basic process for using the Cost Estimating Software System
- Prepare cost estimates using the CESS process

Key Terms

addons	group phase
assembly	item
calculator window	item grid
class C estimate	NPS factor
corrective action	pass
cost estimate	phase
Cost Estimating Software System (CESS)	takeoff
CSI Masterformat	Uniformat II
dimensions pane	work breakdown structure

THE FUNDAMENTALS OF COST ESTIMATING

After a deficiency is identified through the Facility Condition Assessment Survey (FCAS), it is important to:

- Determine the corrective action required to remedy the deficiency
- Enter this information into the FMSS
- Develop a cost estimate for the completion of the identified corrective action using the CESS

The Cost Estimating Professional

A cost estimator is a recognized professional in the design and construction industry. Individuals who complete years of training and examinations can attain certification as an estimator. The goal of this course is not to make you a professional cost estimator. It is to provide NPS personnel with the tools to produce accurate and consistent estimates at a primary level in order to better facilitate the remediation of identified deficiencies throughout the NPS.

A **cost estimate** is a compilation of all the costs of the various elements of a project or effort within an agreed upon list of tasks required to remediate the deficiency.

In order to complete a cost estimate, it is important to have a well-rounded, working knowledge of construction practices. Without the experience and ability to visualize construction, the estimator will not be able to complete an accurate, consistent cost estimate. An inspector must also have enough knowledge of the Cost Estimating Software System (CESS) to understand what information needs to be recorded during the condition assessment inspection. The inspector must include accurate descriptions of the deficiencies and associated corrective actions, including information on materials and quantities, so that the cost estimator can select and record the appropriate assemblies, materials, and quantities needed for the cost estimate.

Sometimes one person or group (the inspector[s]) performs the condition inspection while someone else (the cost estimator) does the computer cost estimating work. It is critical that staff work as a team to assure necessary information is gathered by the inspector during the condition assessment. To perform an accurate, consistent cost estimate, the cost estimator must be provided with sufficient information, as this person will not have seen the deficiency and must entirely rely on what the inspector recorded on the deficiency and appropriate corrective action report.

Without sufficient information, the inspector may need to go back to the asset and repeat the inspection to retrieve the information needed. For example, the inspector must record more information than, for example, "the roof needs repair." The cost estimator will need to know what type of roof it is, how much of the roof needs to be replaced, etc.

Accurate and Consistent Estimates

An **accurate estimate** is a tool to assist key personnel by allowing them to make informed decisions. The NPS relies on these early conceptual estimates for preliminary budgetary planning. Therefore, it is important that the initial estimates for a project be accurate to some degree to enhance the project budget process.

An accurate estimate at this level establishes a baseline estimate that allows for some deviation when the original corrective action and the cost estimate are reviewed. This enables the refinement of estimates required in the future and allows tracking of design and cost changes.

A **consistent estimate** is one that, when completed by any trained NPS individual, will result in a similar result regardless of which trained NPS individual completes the estimate. Each estimate must be kept consistent with the scope of other estimates within the same park, the same region, as well as with estimates Servicewide. The use of the same cost estimating program, Servicewide, enables standardized comparisons between budget and management related work estimates at every level within the NPS. This will allow for increased accountability within the NPS because managers at every level will have better information from which to make decisions.

Every effort must be made to produce an accurate, consistent cost estimate.

Cost estimates that are both accurate and consistent require three major components:

- A clearly and precisely defined corrective action
- Reliable, standardized cost data to maintain Servicewide consistency and integrity
- An NPS employee with estimating experience who can define work into its most basic parts

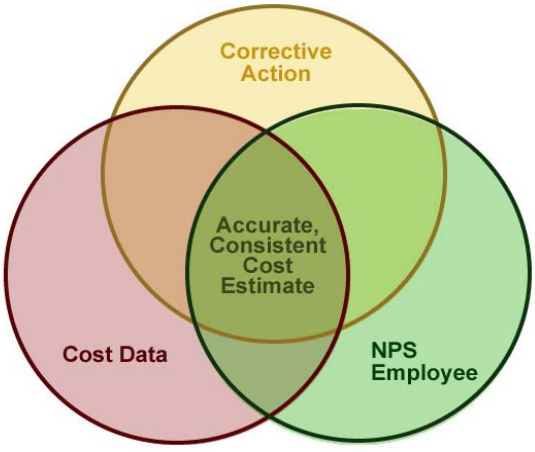


Figure 17: Accurate, Consistent Cost Estimate

Estimates: How Close to the Mark Do You Have to Be?
The cost estimating industry has recognized three levels of estimating similar to the National Park Service's Class C, B, or A estimates. It is important to understand the background for each class of estimate as you begin the process of cost estimating.

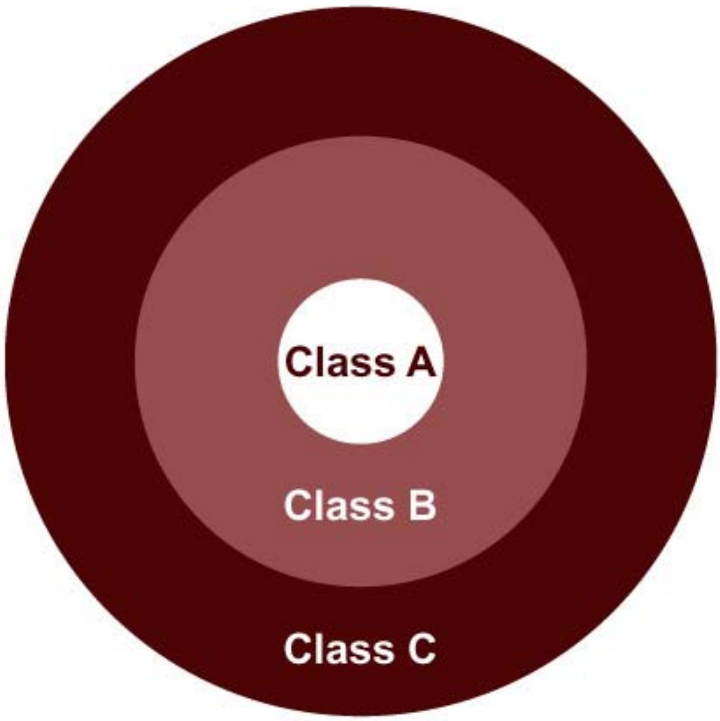


Figure 18: Class C, B, and A Estimates

Imagine the classes of estimates in terms of a target. It is clear that a Class C estimate allows for more flexibility in estimating the cost of a deficiency remediation project. As estimates proceed toward a Class A estimate, the estimated costs must reflect the actual costs of the project more accurately. To use the target concept in Figure 18, a Class A estimate is in the "bull's eye."

The Facility Condition Assessment Survey course is designed to teach NPS employees how to perform a Class C estimate only, not a Class B or Class A estimate.

Class C Estimates

At the preliminary stages of planning and design, it is very difficult to determine the complete scope of the project. At the Class C estimate stage, the design is at the conceptual level and programming of the project is an approximation. The construction industry refers to these estimates as *conceptual* or *order-of-magnitude* estimates. This type of estimate is generally used for the following projects:

- Feasibility studies
- Selection among alternative designs
- Development of project scope and program

The National Park Service currently uses these estimates primarily for the development of project scope and program for entry into the Servicewide Project Management Information System (PMIS).

A Class C estimate is generally a conceptual cost estimate based on square foot costs of similar construction. The accepted industry accuracy range of Class C estimates is -30 percent to +50 percent.

> For example, a Visitor Center that has a Class C estimate of $1,000,000 would be accurately and consistently estimated by various individuals in a range of $700,000 to $1,500,000.

For the NPS, **design contingency** is automatically calculated at 20 percent by the CESS program to account for miscellaneous costs, change orders, and/or "things that go wrong." Design contingencies should NOT be confused with the design cost or construction contingencies.

Although students will only be asked to create Class C estimate for this course, Class B and Class A estimates are described below for further background.

Class B Estimates

After planning and preliminary design has been accomplished, a Class B estimate is prepared. The design usually has determined major cost items at this point. Industry refers to Class B estimates as *budgetary*, *assembly, or system* estimates. This type of estimate is used for:

- Budgeting or construction forecasting
- Authorization for full or partial funding

The National Park Service uses Class B estimates during the design development phase of a project (minimum 30 percent design). A Class B estimate is a combination of lump sum (conceptual costs), assemblies, and unit price costs. The accepted industry accuracy range of Class B estimates is -15 percent to +30 percent.

For example, a $1,000,000 Class B estimate figure actually has a range of $850,000 to $1,300,000.

For Class B estimates, the typical design contingency is 10 to 15 percent.

Class A Estimates

At the end of the design phase and with completed construction documents, a Class A estimate is prepared. This estimate is based on a complete and detailed quantity take-off from the construction drawings and specifications. The industry refers to Class A estimates as the *detailed, definitive construction of unit price* estimates. The purpose of this type of estimate is to

- Encourage the authorization of full funds
- Conduct a cost check of an authorized project
- Present a bid
- Enable a comparison with the contractor's bid
- Provide a control budget for construction

The National Park Service uses Class A estimates at the end of the design process, when the project construction documents are complete. It is often referred to as the Official Government Estimate.

A Class A estimate is based on a thorough quantity estimate from completed construction drawings and specifications. The accepted industry accuracy range of Class A estimates is -5 percent to +15 percent.

For example, a $1,000,000 Class A estimate figure actually has a range of $950,000 to $1,150,000.

Contingencies are generally not used for a final Class A estimate. Sometimes a preliminary Class A is prepared before 20 percent design, and a contingency of 0 to 10 percent can be used.

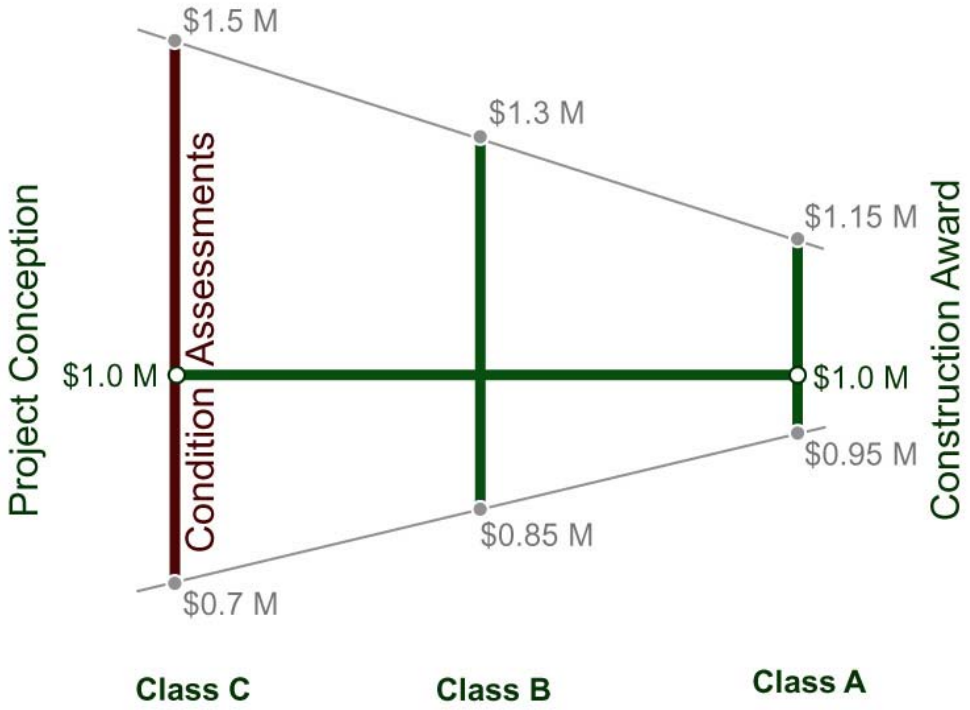


Figure 19: Progression of Estimates, Over Time

The figure above illustrates the process of refining the cost estimate, as a project or corrective action moves from the initial project conception and condition assessment stage (Class C estimate) to the construction award stage (Class A).

CAUTION In the FCAS, the goal of a condition assessment estimate is to produce a Class C level estimate, that is, an estimate within the -30 to +50 percent accuracy range.

DEFICIENCY REMEDIATION—MORE PRACTICE

The concepts of inspection, data collection, identification of deficiencies and determining corrective actions, while discussed previously, are fundamental to accurate cost estimating, and are therefore reinforced here.

Cost estimating for condition assessments begins with data collection. When assessing the deficiencies of an asset, it is *relatively* easy to determine the problem in a majority of situations. The real work is to determine how the deficiency will be remedied.

The proper method for defining a deficiency and the actions required to correct the deficiency relies on the facility inspector. At the point of data collection, the facility inspector must not only describe the deficiency, but also what work is going to be required to fix that deficiency. The facility inspector must use his or her "professional opinion" to determine the best method to repair the deficient asset. "Best method" refers to fixing it correctly the first time–not short-term remedies or "band-aid fixes."

In addition, the facility inspector cannot generalize the repair requirements. The facility inspector has to break the deficiency down into familiar components and units that allow park unit personnel to be as thorough as possible with the cost estimate. The inspector must determine corrective action based on this process.

Determining Corrective Action

The cost-estimating process begins with the determination of which **corrective action** is best suited to address the deficiency. In other words, corrective action is a breakdown of the best method for remediating a deficiency. Determining corrective action is the initial phase in the cost-estimating process and must be thorough in order to allow for the most accurate estimate possible. If the time is taken to develop an appropriate corrective action, then the remaining steps taken within the FCAS can be completed with the highest possible degree of accuracy.

For example, the following would be considered an incomplete corrective action:

> DEFICIENCY: There is a large, deep washed-out trail about 2 miles from the trailhead.
> CORRECTIVE ACTION: Replace with the washed-out fill that is lying at the bottom of the hill. Check again in two months.

The corrective action defined below is more complete.

> DEFICIENCY: Washed out trail, wheel marker 2235 to 2247. Washout dimensions 12 inches deep x 12 inches wide.
> CORRECTIVE ACTION: Repair trail tread way with imported fill, compact. Install a timber water bar (approx. 10 feet long) above wash-out area.

Student Exercise: Deficiency Remediation and Corrective Action Plan

Using the examples below, discuss the best remediation and determination of corrective action. Be prepared to share your corrective action with the class.

Example 1

DEFICIENCY: 200-square foot section of asphalt shingle roof needs to be replaced. Area is below a roof penetration (chimney), and there is evidence of water infiltration that has damaged the roof sheathing. Attic inspection verified that roof framing is intact.

CORRECTIVE ACTION:

Example 2

DEFICIENCY: 4'x25' concrete sidewalk is heaving at joints due to pine tree root infiltration, creating a tripping hazard. This tree has significance in this landscape (can't be damaged or removed, including roots).

CORRECTIVE ACTION:

THE COST ESTIMATING TOOL: INTRODUCTION TO THE CESS

The Cost Estimating Software System (CESS) is a tool designed to assist in determining the cost for repairing identified asset deficiencies. The tool is helpful only if great care is taken to ensure that accurate and complete information is gathered and used in combination with the expertise of the assessor.

The basics of cost estimating require that a deficiency is first identified and that the appropriate personnel have agreed upon a corrective action before a cost estimate can begin.

The CESS

The CESS being utilized by the NPS is known commercially as the Timberline™ EstimatingTool. It is a Windows™-based cost estimating software system that has two key components: a database and a spreadsheet.

The key to producing an estimate is to copy and to quantify the appropriate items from the database to the spreadsheet. This is referred to as **"takeoff**". The system will automatically calculate amounts and totals using the cost data. The total costs will include factors that are added to the estimate to ensure that the estimate is as accurate as possible.

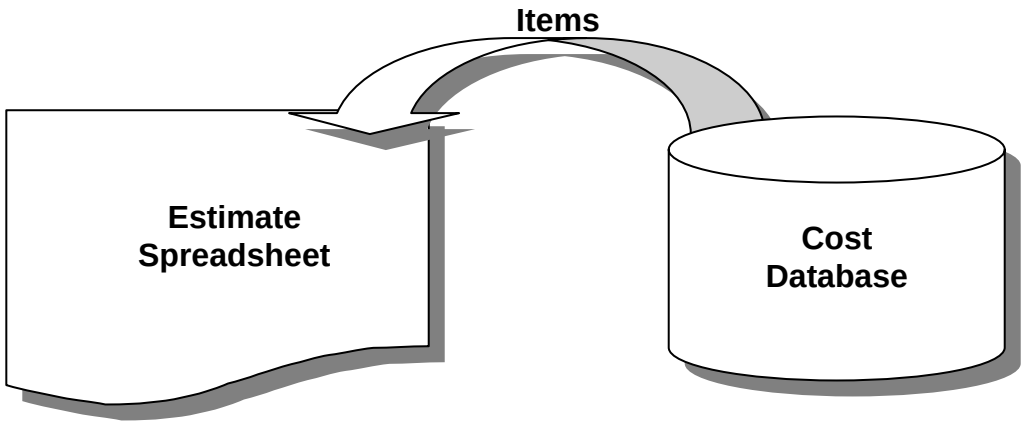


Figure 20: Takeoff Process in the CESS

The goal of the software is to help the user produce an estimate for individual deficiencies and to present the estimate data in a spreadsheet format. The cost data uses industry standards and includes NPS location cost factors.

Proper use of the CESS will result in consistent cost estimates using standardized cost data across the entire NPS.

Glossary Terms for the CESS

Addon: A factor that adds “mark-up” costs to the estimate. Factors include Historic Preservation, Contingencies, General Conditions, and Overhead & Profit.

Allocatable: A property of an addon that causes it to be distributed among specified estimate costs (labor, material, and equipment). The Historic Preservation factor, the design contingency, the NPS factor, and the Park Location factor are distributed between the labor, material and equipment costs in the FMSS Work Order Cost tab screen.

Assemblies: A collection of items needed to complete a particular activity or unit of work. Assemblies allow multiple items to be taken off in a single operation. Assemblies are grouped and indexed by Uniformat (i.e., wall systems, foundation systems, HVAC systems, etc.).

City Cost Index: (Need definition here)

Database: The cost data that is used to create an estimate. All cost elements are contained in the database.

Equipment (Tools) Amount: The cost of equipment (machines, tools or apparatus) required to complete a corrective action (e.g., the equipment cost for hauling excavated or borrow material two miles round trip with a six cubic yard dump truck is $1.90/cubic yard, not including cost for loading).

Estimating Factor: Assumptive conditions that drive costs for cost estimating projects. These six factors (CCI Factor, Historic Preservation Factor, Design Contingency, Overhead, Profit, and General & Administrative) must be considered when developing a cost estimate.

Group Phase: A major section of the CESS cost data. These relate to the Level 1 and 2 CSI Masterformat sections.

Item: Individual building block for estimates that track quantities, hours, and costs.

Labor Amount: The cost of the labor (human effort or work) required to complete a corrective action (e.g., the cost to install 5/8” thick gypsum plasterboard (drywall) on walls not including finish is $0.23/square foot). Subcontract and Other amounts are treated as Labor costs in FMSS.

Material Amount: The cost of the materials (parts, goods, stock) required to complete a scope or work (e.g., the material cost to install 5/8” thick gypsum plasterboard (drywall) is $0.26/square foot).

Phase: A minor section of the CESS cost data which relates to the Level 3 and 4 CSI (Construction Specification Institute) Masterformat sections.

Service Cost: The Service Cost field in the FMSS Work Order Cost tab screen is the summation of general conditions and overhead & profit addons in CESS. Service Cost reflects the estimated costs of outsourcing the project.

Spreadsheet: The primary view of the cost estimate. Cost data from the database is copied into the spreadsheet.

Takeoff: A method of selecting and quantifying items or assemblies needed for a particular estimate. There are a variety of takeoffs, including Quick Takeoff, Item Takeoff and Assembly Takeoff.

Unit Price: Prices broken down by a measurable unit. For example: most excavation is generally measured in cubic yards, so prices would be given in $/cubic yard.

Items: Building Blocks for Your Estimate

Items are the individual building blocks for estimates that are used to track quantities, hours and costs (Labor, Materials, etc). Items are indexed by Group Phase, then Phase.

An item is a single component used in performing a repair. For example, 2 x 4 planks or nails are individual items. Items in CESS contain the following basic information:

Attribute	Example	Comment
Phase Code	06110.545 Framing, Misc.	Items are indexed by Phase
Item Code	8700	Item identifier
Description	Framing, miscellaneous, steel construction, 2" x 8"	Scope, including method and material
Takeoff Unit	Mbf	Quantification unit (mbf=thousand board feet)
Crew*	CARP2	Labor and Equipment resources. CARP2 = 2 carpenters
Productivity**	9.19540 ch/mbf	Labor hours per unit. ch = Crew hours
Unit Price***	$ 71.40/ch	Cost per hour for a unit of labor
	$ 1,309/mbf	Cost per unit of material

Figure 21: Item Information

NOTE:
*Some items do not have labor or equipment costs. These items will not have a crew or productivity value.
**Productivity is also referred to as a Conversion field in the CESS.
***Items may contain unit prices for labor, materials, subcontract, equipment and/or other costs.

CESS items do not include any waste. You must account for waste in your takeoff quantities. For example, if you needed 13,500 pounds of concrete for a sidewalk, you could expect some waste in transporting, pouring, and finishing the concrete. As a result, you might account for the waste by using 14,500 pounds in your CESS estimate.

CESS Data Indexing for Items

The item cost data is indexed based on a modified version of the CSI Masterformat 1995 specification. Group Phase Level 1 of the original specification appears below.

This information can help speed searches for specific items because you can focus on the specific category in which to begin your search. In other words, if you know you have an issue with a door or window, begin your search in category 8000 instead of beginning with the general requirements category (1000).

01000.000	GENERAL REQUIREMENTS
02000.000	SITE CONSTRUCTION
03000.000	CONCRETE
04000.000	MASONRY
05000.000	METALS
06000.000	WOOD & PLASTICS
07000.000	THERMAL & MOISTURE PROTECTION
08000.000	DOORS & WINDOWS
09000.000	FINISHES
10000.000	SPECIALTIES
11000.000	EQUIPMENT
12000.000	FURNISHINGS
13000.000	SPECIAL CONSTRUCTION
14000.000	CONVEYING SYSTEMS
15000.000	MECHANICAL
16000.000	ELECTRICAL

CSI Masterformat—Developed and maintained by the Construction Specification Institute. This index is an industry standard that provides a breakdown of work or products installed in typical construction or facility repair projects. Also known as a “work breakdown structure” (WBS), knowledge of the CSI Masterformat can help NPS personnel in determining corrective actions and identifying cost estimate items. The item cost data is indexed based on this WBS.

Uniformat II specifications are another industry standard WBS that are sometimes used in cost estimating. Uniformat II is used for NPS assemblies in the CESS.

Please refer to the Resources section for a complete listing of the modified CSI Masterformat 1995 specification (Levels 1-4) and Uniformat II specifications as it appears in the CESS.

Items appear in the CESS as follows:

	CESS	CSI Masterformat Level
	Group Phase	Level 1 and 2
	Phase	Level 3 and 4
	Item	

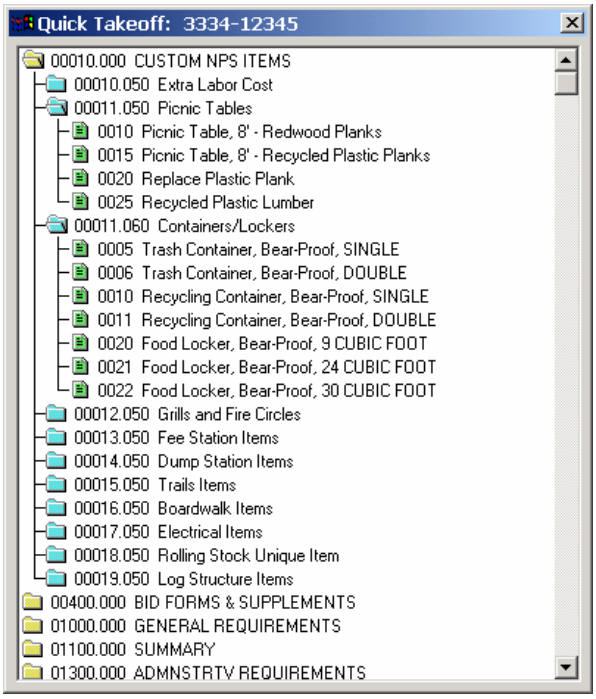

Quick Takeoff: 3334-12345
00010.000 CUSTOM NPS ITEMS
00010.050 Extra Labor Cost
00011.050 Picnic Tables
0010 Picnic Table, 8' - Redwood Planks
0015 Picnic Table, 8' - Recycled Plastic Planks
0020 Replace Plastic Plank
0025 Recycled Plastic Lumber
00011.060 Containers/Lockers
0005 Trash Container, Bear-Proof, SINGLE
0006 Trash Container, Bear-Proof, DOUBLE
0010 Recycling Container, Bear-Proof, SINGLE
0011 Recycling Container, Bear-Proof, DOUBLE
0020 Food Locker, Bear-Proof, 9 CUBIC FOOT
0021 Food Locker, Bear-Proof, 24 CUBIC FOOT
0022 Food Locker, Bear-Proof, 30 CUBIC FOOT
00012.050 Grills and Fire Circles
00013.050 Fee Station Items
00014.050 Dump Station Items
00015.050 Trails Items
00016.050 Boardwalk Items
00017.050 Electrical Items
00018.050 Rolling Stock Unique Item
00019.050 Log Structure Items
00400.000 BID FORMS & SUPPLEMENTS
01000.000 GENERAL REQUIREMENTS
01100.000 SUMMARY
01300.000 ADMNSTRTV REQUIREMENTS

Figure 22: Examples of Items

Assemblies

An assembly is a collection of items used in performing a specific repair. For example, an assembly to repair a wooden footbridge could consist of 2 x 4 planks, nails, and other items. It is recommended to use this section when doing a cost estimate since the assemblies combine all the items you need for a particular project. Otherwise, to be included in a repair, each individual item must be located in the cost estimate.

NOTE: Equipment/feature records in FMSS are coded to identify which assembly should be used to cost a deficiency of that feature.

New assemblies are constructed as needed. Contact the Help Desk if you identify a need for an assembly that would be used many times by a number of parks (as opposed to only once or twice at a handful of parks). The management team will consider these requests.

The assembly cost data is indexed based on a modified version of Uniformat II. (This version of Uniformat II is also used in FMSS.) Levels 1 and 2 appear below.

NOTE: NPS custom built assemblies generally start with the letter “G”.

A	**SUBSTRUCTURE**
A10	Foundations
A20	Basement Construction
B	**SHELL**
B10	Superstructure
B20	Exterior Closure
B30	Roofing
C	**INTERIORS**
C10	Interior Construction
C20	Stairs
C30	Interior Finishes
D	**SERVICES**
D10	Conveying
D20	Plumbing
D30	Heating, Ventilation and Air Conditioning (HVAC)
D40	Fire Protection
D50	Electrical
E	**EQUIPMENT AND FURNISHINGS**
E10	Equipment
E20	Furnishings
F	**SPECIAL CONSTRUCTION AND DEMOLITION**
F10	Special Construction
F20	Selective Demolition
G	**BUILDING SITEWORK**
G10	Site Preparation
G20	Site Improvements
G30	Site Civil/Mechanical Utilities
G40	Site Electrical Utilities
G90	Other Site Construction
R	**RAILROADS**
R10	Self Propelled Rolling Stock
R20	Towed Rolling Stock
R30	Non-Rolling Stock Railroad Assets

NOTE: Please refer to the Resource section for a complete listing of the modified CSI Masterformat and Uniformat II specifications as it appears in CESS.

Assemblies appear in the CESS in a hierarchical manner as follows:

	CESS	Uniformat II
	Group Assembly	Level 1, 2 and 3
	Assembly	Level 4

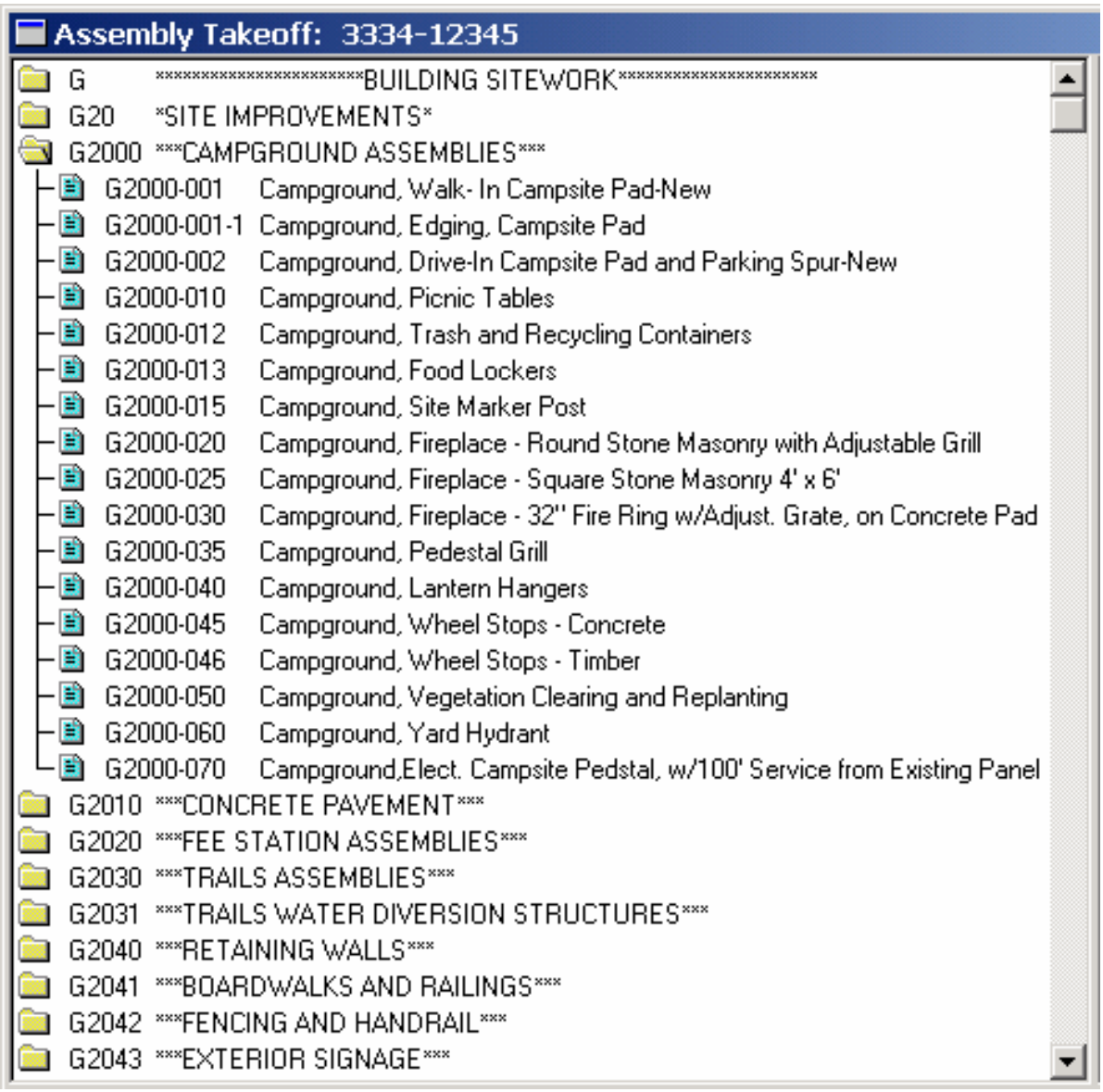

Assembly Takeoff: 3334-12345
G **********BUILDING SITEWORK**********
G20 *SITE IMPROVEMENTS*
G2000 ***CAMPGROUND ASSEMBLIES***
G2000-001 Campground, Walk- In Campsite Pad-New
G2000-001-1 Campground, Edging, Campsite Pad
G2000-002 Campground, Drive-In Campsite Pad and Parking Spur-New
G2000-010 Campground, Picnic Tables
G2000-012 Campground, Trash and Recycling Containers
G2000-013 Campground, Food Lockers
G2000-015 Campground, Site Marker Post
G2000-020 Campground, Fireplace - Round Stone Masonry with Adjustable Grill
G2000-025 Campground, Fireplace - Square Stone Masonry 4' x 6'
G2000-030 Campground, Fireplace - 32" Fire Ring w/Adjust. Grate, on Concrete Pad
G2000-035 Campground, Pedestal Grill
G2000-040 Campground, Lantern Hangers
G2000-045 Campground, Wheel Stops - Concrete
G2000-046 Campground, Wheel Stops - Timber
G2000-050 Campground, Vegetation Clearing and Replanting
G2000-060 Campground, Yard Hydrant
G2000-070 Campground,Elect. Campsite Pedstal, w/100' Service from Existing Panel
G2010 ***CONCRETE PAVEMENT***
G2020 ***FEE STATION ASSEMBLIES***
G2030 ***TRAILS ASSEMBLIES***
G2031 ***TRAILS WATER DIVERSION STRUCTURES***
G2040 ***RETAINING WALLS***
G2041 ***BOARDWALKS AND RAILINGS***
G2042 ***FENCING AND HANDRAIL***
G2043 ***EXTERIOR SIGNAGE***

Figure 23: Examples of Assemblies

CESS/Timberline Estimating Screen

Below is the estimate spreadsheet, the main screen of the CESS. The spreadsheet only shows one row at this point because an estimate has not been initiated.

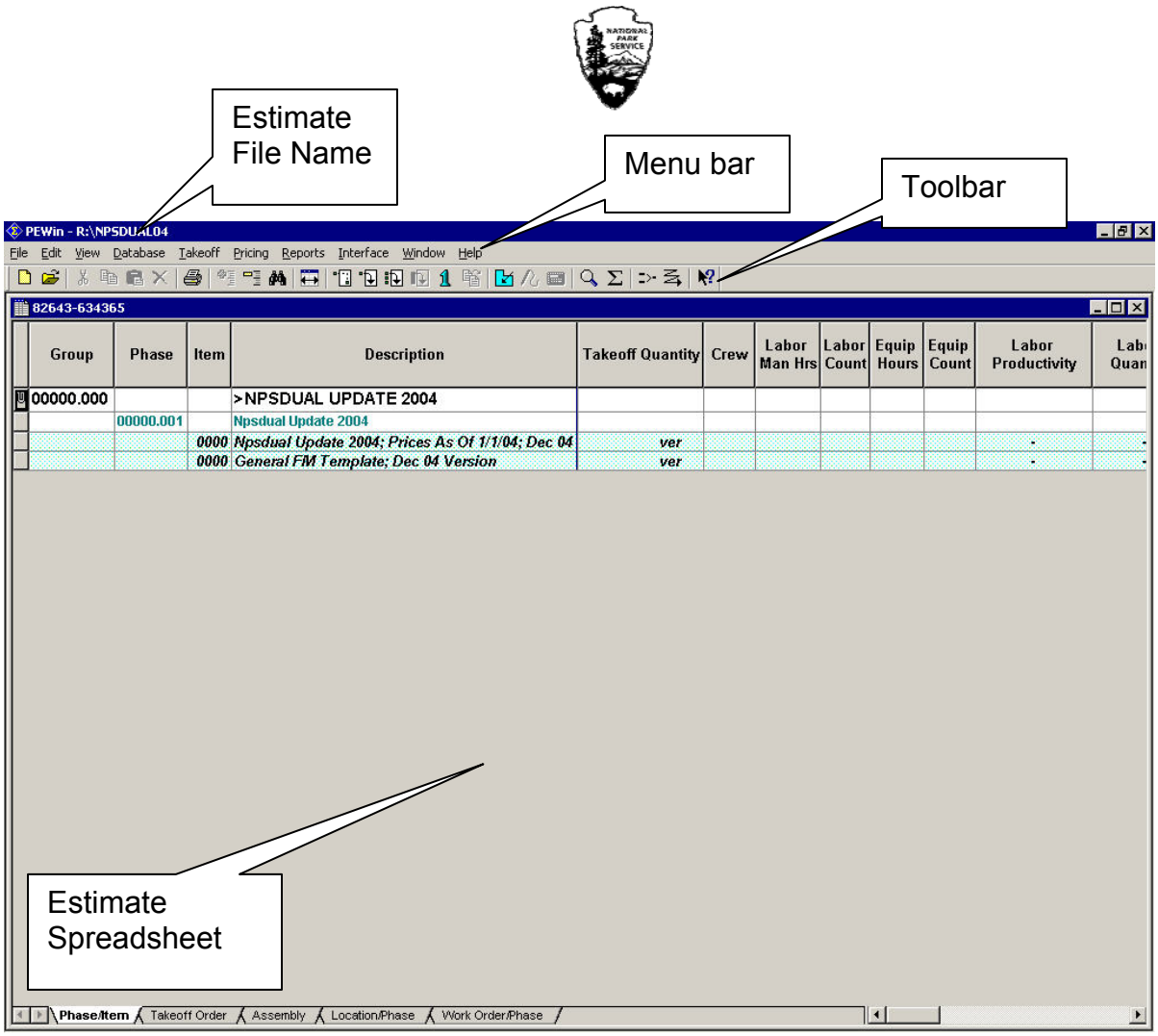


Figure 24: Cost Estimate Spreadsheet

NOTE: If the estimate spreadsheet is maximized, the estimate file name will appear on the top most bar (usually blue background with white letters).

Navigation: The Menu Bar

The following menu items are most frequently employed in the CESS.

FILE:	Allows you to perform functions within the application such as New Estimate creation (for templates), Open Estimate, Copy Estimate, and Exit.
VIEW:	Allows you to collapse or expand the spreadsheet, and to zoom in or out.
TAKEOFF:	Allows you to copy cost items from the database into the estimate spreadsheet (Quick, Item, Assembly Takeoff).
REPORTS:	Allows you to select and print reports.
HELP:	Answers questions and provides support.

Navigation: Using the Toolbar Buttons

The following toolbar buttons are most frequently employed in CESS. Use one of the following buttons to find the appropriate items to include your estimate:

QUICK TAKEOFF
- Useful to locate only one or two items in the database quickly
- Items are sent directly to the spreadsheet as selected with no option for review

ITEM TAKEOFF
- Useful if no assembly is available for the scope of the work to be estimated
- Allows review of the items prior to sending them to the spreadsheet

ASSEMBLY TAKEOFF
- Useful for finding groups of appropriate items quickly
- Look here first and try to find the best fitting assembly for the intended corrective action
- Helps prevent the omission of items

<u>The following buttons are used to create quantities, view totals, and find help.</u>

TOTALS
- Use this button to open the Totals window

HELP
- Click on this button, then click on anything on the screen to view Help

PASS
- Click on this button when calculating the quantities for the items in the item grid

Saving Changes to the Estimate Spreadsheet

The CESS is a disk-based program, which means that every action made by the user is automatically saved on the server at WASO. Since every change to the spreadsheet is instantly saved, <u>users do not need to save manually</u>. There is no “Save” button or command. This also means that if the power goes out, or if the connection is lost, the contents of the spreadsheet will be preserved and no work should be lost.

Unfortunately, this also means that *any deletions or changes on the spreadsheet are not reversible*. There is no “Undo”.

Where Are Estimate Files Stored?
CESS estimates are stored in folders. Each park has a unique folder. When a park employee initiates the CESS process from the FMSS, the system recognizes the park. The CESS creates and stores all estimates related to a park in the same folder.

When finding an existing estimate through the FMSS, the system knows where to find the file and opens the file to the estimate spreadsheet.

Navigation Options for Finding Items
A critical skill for use of the CESS is finding items and assemblies. In searching for items, the easiest and most direct way is to use a known CSI Masterformat number in the item list pane. If a user knows the CSI Masterformat main category number of the item(s) needed, enter this in "top level number" field of the section. For example, enter "04000" for masonry or "16000" for electrical items. This will allow for a quick location of the specific item desired. In the item list pane, the closer an entered number is to the CSI Masterformat number, the more quickly the CESS will complete the search for the correct item. The search will begin at that number entered rather than at the beginning of the CSI Masterformat numbering system. Another effective method of searching for many items is to use the RS Means Index.

Finding Items or Assemblies
To search for items or assemblies in the CESS:

1. Select the Find/Go to icon (binoculars).

2. Enter the word or words the user wants to locate in the list. Users can search by the material, work activity, work location, or any combination.

3. Select the "Go" button.

NOTE: To get more detail on some of the item lines, words have been abbreviated. In the following list, some of these abbreviations are shown. Thus, if users are searching on "siding", they should also do a search for "sdg" to see all items with siding. Sometimes the words are listed as singular; at other times they are plural.

Material	Work Activity	Work Location
asphalt (asph)	Clearing	backcountry
brick (brk)	electrical (elect, or elec, or electric	boardwalk
cabinets (cab)	excavate is listed as excav	Bridge
carpet	finish (finished)	campground
columns (col)	foundation (fdn)	fee station
concrete (conc)	install (installed)	fireplace
doors (dr)	insulation (insul)	Floor
drywall	Paint	foundation
joist (jsts)	Plaster	manhole
masonry	Plastic	partitions
paint	prepare (prep)	railroad
pipe (piping)	Repair	Road
plaster	Replace	stairs
plywood (ply)	Replanting	steps (stepping)
precast (prcst)	roof (roofing)	trail
siding (sdg)	sand (sanded)	walkway
steel	Sawn	walls (wll)
Tile	Strip	window
windows (wind)		
wood (wd)		

When the user finds the desired assembly, they can stop the search and select the assembly desired by simply double clicking on the required assembly.

Jump Search

Searching for assemblies and items in CESS can take a great deal of time if you search the entire database. To shorten the search time, you can highlight the group phase of an assembly, and then use the Find/Go To Icon in CESS. This shortcut will “jump” your search to start at the identified group phase.

CESS EXERCISES

This section reviews how to perform a Quick Takeoff, an Item Takeoff, and an Assembly Takeoff. Estimators must know how to perform these takeoffs before they begin to use CESS.

Getting Started

CAUTION For training laptop purposes, students will create new estimate files in this course. However, in the normal work process, estimate files will be automatically created for NPS employees.

NOTE: In the step-by-step instructions for CESS that follow, items that are selected or content that is entered are indicated by **bolded text**.

While CESS is open, create an estimate file for each exercise as follows:

1. Open CESS.
2. Click on to create a New Estimate.
3. The following window opens.

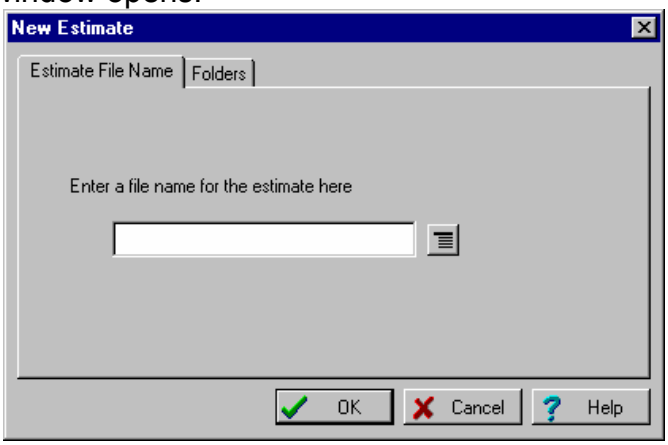


Figure 25: New Estimate (For Training Laptop Purposes Only)

4. Enter the exercise file name as 'Your Initials-Exercise Name.'
   For example: **NJP-Quick Takeoff**

5. Click OK to continue to the "Estimate Information" window.

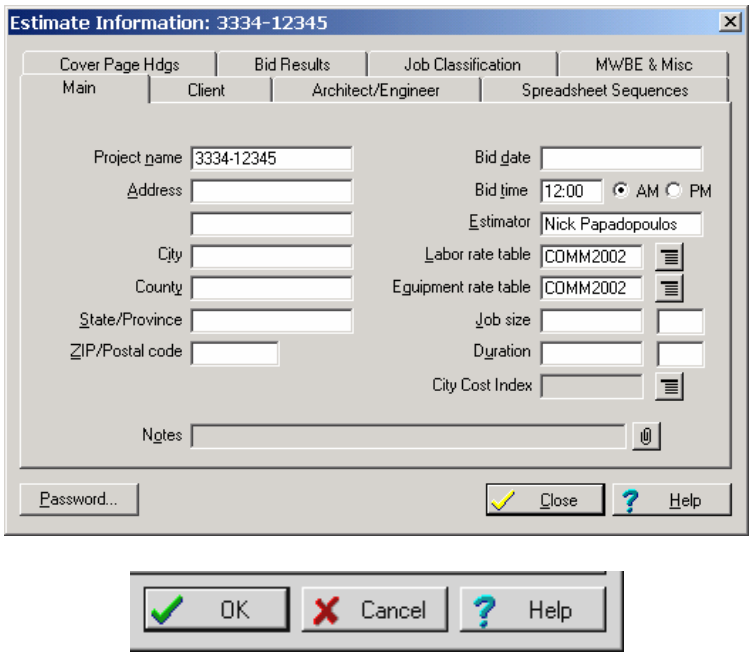


Figure 26: Estimate Information Window (For Training Purposes Only)

6. Enter **your first and last name** in the "Estimator" field, and then click OK.

NOTE: You will repeat these initial six steps to create a new estimate file for each takeoff method (Quick, Item, and Assembly Takeoff).

Quick Takeoff: Removing Two Types of Fences

Quick Takeoff is the easiest way to get items into an estimate. You can see the results immediately because you are working directly in the spreadsheet.

1. From the spreadsheet, click the Quick Takeoff button to open the Quick Takeoff window.

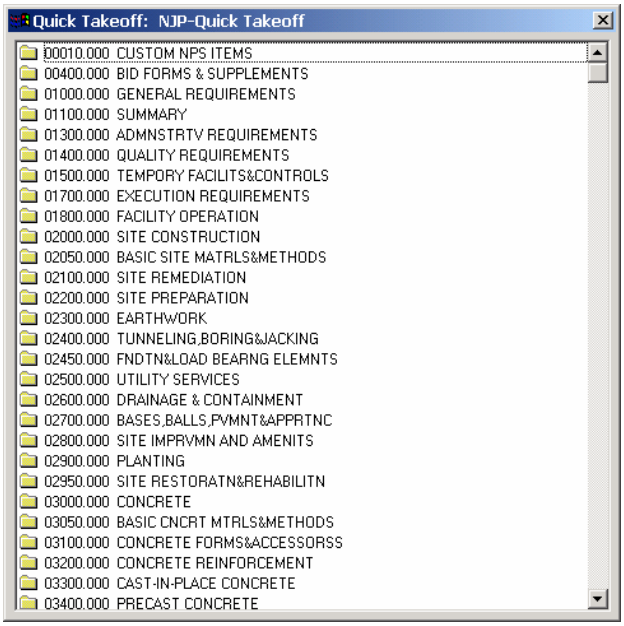


Figure 27: Quick Takeoff Window

2. Double-click on the yellow folder **02200.000 SITE PREPARATION**. This is a Group Phase. The Quick Takeoff window displays the Phases that are contained in the Group Phase.

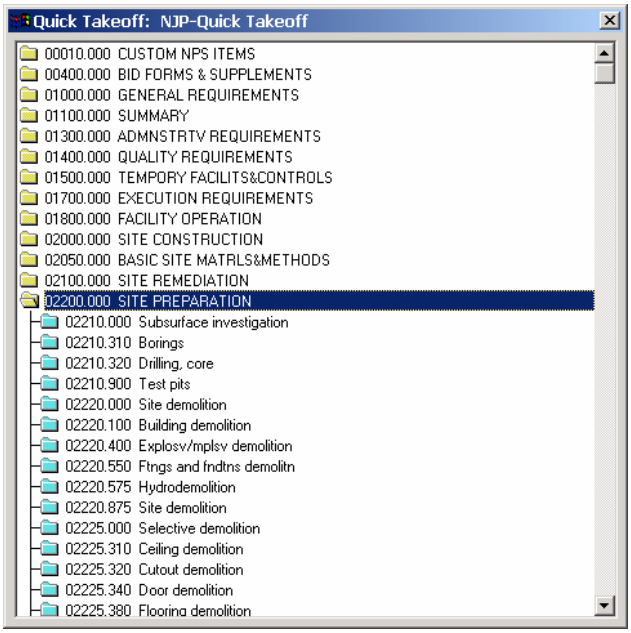


Figure 28: Quick Takeoff—Group Phase

3. Double-click on a blue folder **02200.220 Fencing Demolition**. This is a Phase. The Quick Takeoff window displays the Items that are contained in the Phase.

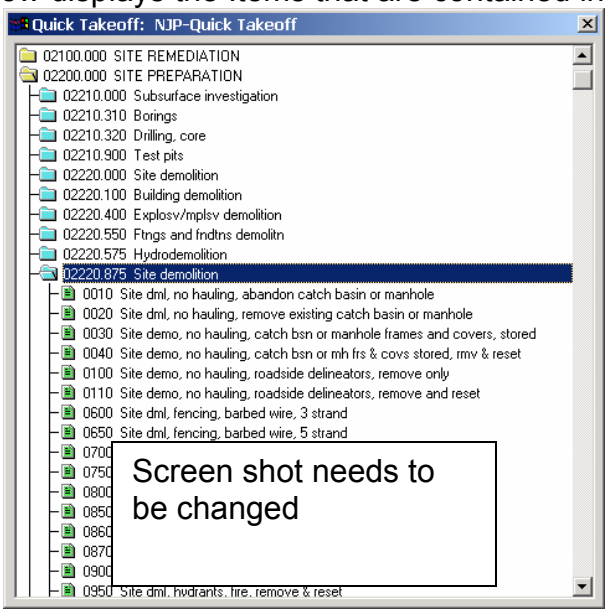

Quick Takeoff: NJP-Quick Takeoff
02100.000 SITE REMEDIATION
02200.000 SITE PREPARATION
02210.000 Subsurface investigation
02210.310 Borings
02210.320 Drilling, core
02210.900 Test pits
02220.000 Site demolition
02220.100 Building demolition
02220.400 Explosv/mplsv demolition
02220.550 Ftngs and fndtns demolitn
02220.575 Hydrodemolition
02220.875 Site demolition
0010 Site dml, no hauling, abandon catch basin or manhole
0020 Site dml, no hauling, remove existing catch basin or manhole
0030 Site demo, no hauling, catch bsn or manhole frames and covers, stored
0040 Site demo, no hauling, catch bsn or mh frs & covs stored, rmv & reset
0100 Site demo, no hauling, roadside delineators, remove only
0110 Site demo, no hauling, roadside delineators, remove and reset
0600 Site dml, fencing, barbed wire, 3 strand
0650 Site dml, fencing, barbed wire, 5 strand
Screen shot needs to be changed

Figure 29: Phase—Site Demolition

4. Double-click on **1600 Site dml, fencing, barbed wire, 3 strand** in the list.

5. The item has been copied from the database and added to this estimate.

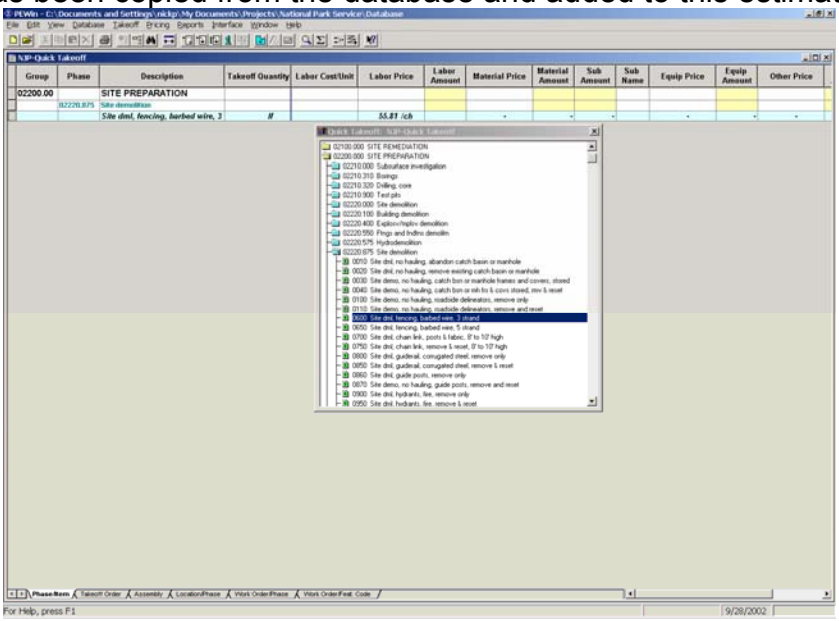


Figure 30: Specific Items Appearing on the Spreadsheet—Demolition

6. Repeat this step and double-click on **1700 Site dml, chain link, posts & fabric, 8' to 10' high**. Notice how this item appears on the spreadsheet.

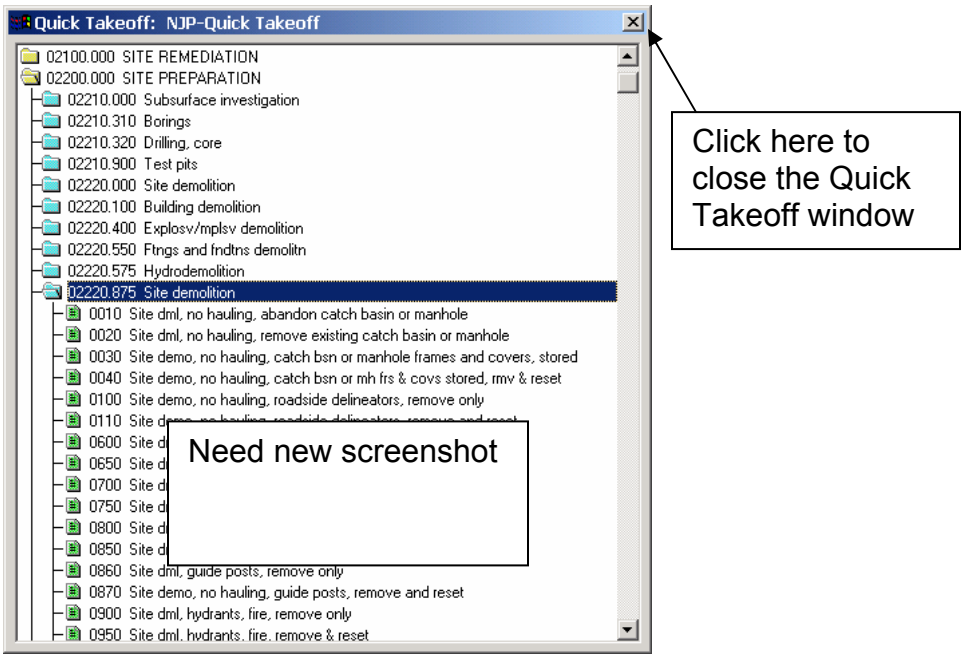

Quick Takeoff: NJP-Quick Takeoff
02100.000 SITE REMEDIATION
02200.000 SITE PREPARATION
02210.000 Subsurface investigation
02210.310 Borings
02210.320 Drilling, core
02210.900 Test pits
02220.000 Site demolition
02220.100 Building demolition
02220.400 Explosv/mplsv demolition
02220.550 Ftngs and fndtns demolitn
02220.575 Hydrodemolition
02220.875 Site demolition
0010 Site dml, no hauling, abandon catch basin or manhole
0020 Site dml, no hauling, remove existing catch basin or manhole
0030 Site demo, no hauling, catch bsn or manhole frames and covers, stored
0040 Site demo, no hauling, catch bsn or mh frs & covs stored, rmv & reset
0100 Site demo, no hauling, roadside delineators, remove only
0860 Site dml, guide posts, remove only
0870 Site demo, no hauling, guide posts, remove and reset
0900 Site dml, hydrants, fire, remove only
0950 Site dml, hydrants, fire, remove & reset
Need new screenshot
Click here to close the Quick Takeoff window

Figure 31: Closing the Quick Takeoff Window

7. Close the Quick Takeoff window by clicking (upper right corner of the Quick Takeoff window).

8. The spreadsheet should appear with the Group Phase, Phase, and two selected items (light blue background).

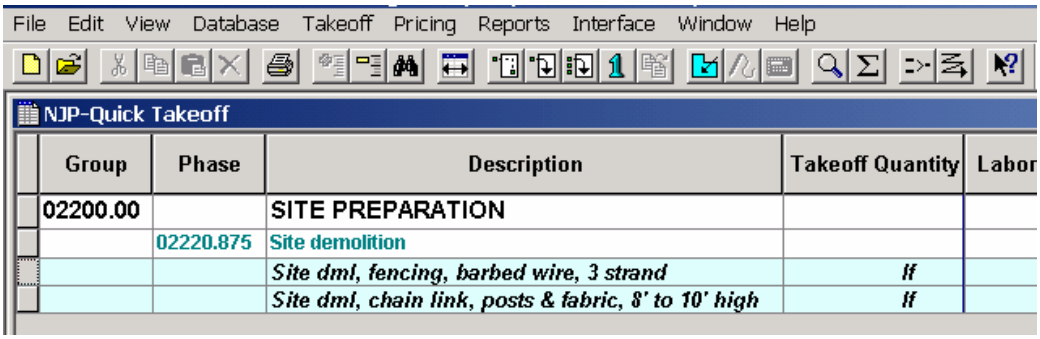


Figure 32: Spreadsheet with Group Phase

The next step is to calculate the quantities for these items. Enter in a quantity for the first item, and use the calculator to calculate a quantity for the second item.

9. Click on the Takeoff Quantity cell of item **Site dml, fencing, barbed wire, 3 strand**. Notice the unit of measure: lf = linear feet.

10. Enter a value of **200**. Hit the tab key after entering the amount to refresh the screen. The system automatically calculates any amounts using the unit prices from the cost database. This is the basic concept of takeoff.

    NOTE: The background color of the item changed from light blue to white and the text is no longer in italics. This is a visual indicator that this item has costs in the estimate.

11. Navigate to (or click on) the Takeoff Quantity cell of item **Site dml, chain link, posts & fabric, 8' to 10' high**.

12. Use the Calculator feature for assistance in quantifying this item. Click to open the Calculator window.

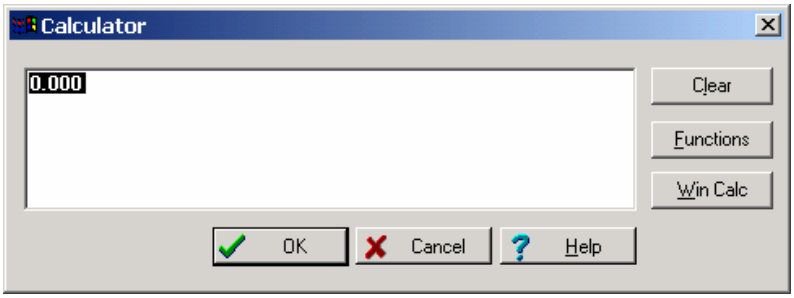
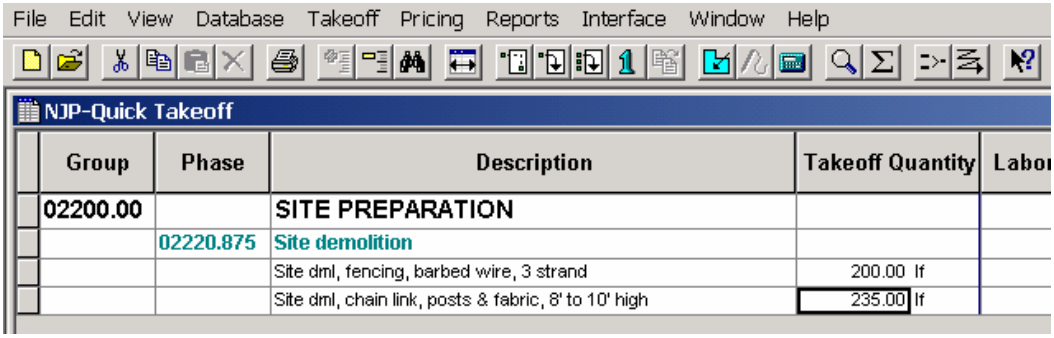


Figure 33: Calculator Window

a. Click the Clear button (or the Backspace key on your keyboard) to remove the **0.000** value.
b. Enter **150+65+20** and press the Enter key on your keyboard. Note the value of **235.00** in the Calculator window.
c. Click the OK button to close the Calculator window and paste the **235.00** into the Takeoff Quantity cell.

The spreadsheet should look like the screen below.



Group	Phase	Description	Takeoff Quantity	Labor
02200.00		SITE PREPARATION		
	02220.875	Site demolition		
		Site dml, fencing, barbed wire, 3 strand	200.00 lf	
		Site dml, chain link, posts & fabric, 8' to 10' high	235.00 lf	

Figure 34: Quick Takeoff Spreadsheet, with -s

Users have many navigation and selection options when working with the Quick Takeoff list.

Navigation Options

a. Increasing the size of the Quick Takeoff window to view more data

b. Using the scroll bar to quickly scroll up and down the list
c. Using the Up and Down arrows on your keyboard to quickly navigate the list
d. Using the Left and Right arrows to expand and collapse Group Phases and Phases
e. Typing in a Phase number (while the Quick Takeoff Window is open) enables you to jump around the database quickly. Ex: Type in 02820.890 and the Phase Wire Fencing will be highlighted in the list
f. Right-clicking in the Quick Takeoff window and clicking Expand All to view the list with all the items. Clicking Collapse All to view the list with only the Group Phases
g. Right-clicking in the Quick Takeoff window and clicking Sort by Description to view the list sorted by item description. Clicking Sort by Phase/Item to view the list by Group Phase, Phase and item (default).

Selection Options

- Double-click on an item
- Drag an item from the list onto the spreadsheet
- Hold the SHIFT or CTRL key while clicking to select multiple items, then drag them onto the spreadsheet

Student Exercise: Quick Takeoff

- This cost database contains over 42,000 items. Review the CSI Masterformat specification in the Resources section. Familiarization with the cost data will save many hours of searching through the cost database.
- Experiment with Quick Takeoff using the various Navigation and Selection options.
- Consider the following:
  - Try to takeoff a replacement item for the fence.
    Hint: Phase 02820.420 Wire fencing
  - How will you dispose of the fence that must be removed?
- Experiment with the calculator when quantifying items.

Item Takeoff: Repair and Replace Flooring for a 40’ x 25’ Room

Item Takeoff provides a convenient method to takeoff groups of items and quickly calculates their takeoff quantities. Users can review items and modify them for use in the current estimate before generating them to the spreadsheet, when performing item takeoffs.

1. Repeat the Getting Started process on page 99.

   Enter the exercise file name as ‘Your Initials-Item Takeoff’
   Example: **NJP-Item Takeoff**

2. From the spreadsheet, click the Item Takeoff button to open the Item Takeoff window.

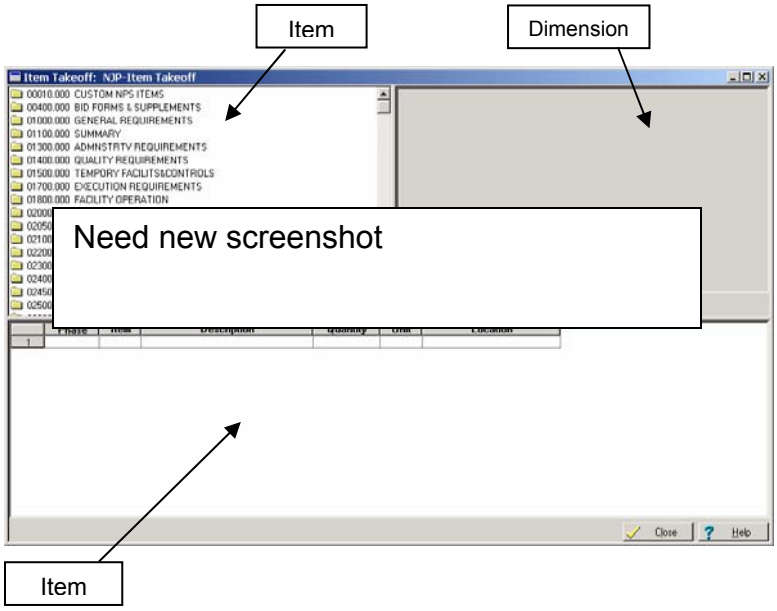


Figure 35: Item Takeoff

- The Item List pane displays items from the database. This works just like the Quick Takeoff window, including all the navigation and selection options.
- The Item Grid pane shows the items taken off. Unlike Quick Takeoff (which adds items to the spreadsheet), items are added to the Item Grid prior to being added to the spreadsheet.

3. Navigate the Item List and locate Phase **09060.120 Selective demo, flooring**. Move up and down the list either by using the scroll function on the right of the screen or by using the page down key. Double click to display the items in the Phase.

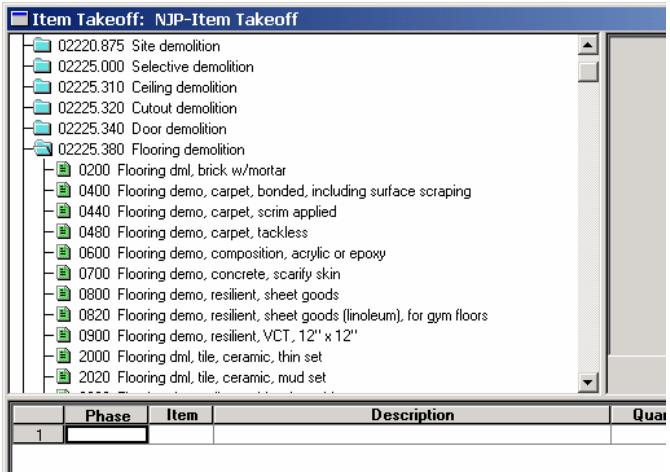

Item Takeoff: NJP-Item Takeoff
02220.875 Site demolition
02225.000 Selective demolition
02225.310 Ceiling demolition
02225.320 Cutout demolition
02225.340 Door demolition
02225.380 Flooring demolition
0200 Flooring dml, brick w/mortar
0400 Flooring demo, carpet, bonded, including surface scraping
0440 Flooring demo, carpet, scrim applied
0480 Flooring demo, carpet, tackless
0600 Flooring demo, composition, acrylic or epoxy
0700 Flooring demo, concrete, scarify skin
0800 Flooring demo, resilient, sheet goods
0820 Flooring demo, resilient, sheet goods (linoleum), for gym floors
0900 Flooring demo, resilient, VCT, 12" x 12"
2000 Flooring dml, tile, ceramic, thin set
2020 Flooring dml, tile, ceramic, mud set
Phase
Item
Description
1

Figure 36: Flooring Demolition Example

4. Double-click on item **0900 Flooring demo, carpet, bonded, including surface scraping** in the list. The item will immediately appear on the Item Grid.

5. Navigate the Item List and locate Phase **09060.120 Resilient Tile Flooring**. Double click to display the items in the Phase or, if the item is already highlighted, simply hit enter.

6. Double-click on item **7000 Resilient, vinyl composition tile, 12" x 12", 1/16" thick** in the list. The item will immediately appear on the Item Grid.

The Item Grid pane should look like the following.

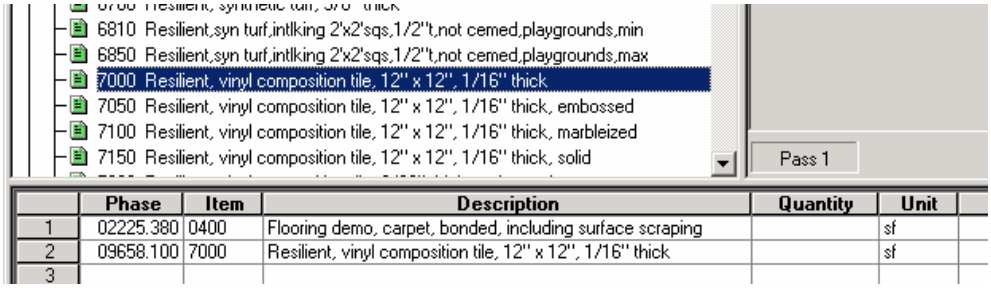

6810 Resilient,syn turf,intlking 2'x2'sqs,1/2"t,not cemed,playgrounds,min
6850 Resilient,syn turf,intlking 2'x2'sqs,1/2"t,not cemed,playgrounds,max
7000 Resilient, vinyl composition tile, 12" x 12", 1/16" thick
7050 Resilient, vinyl composition tile, 12" x 12", 1/16" thick, embossed
7100 Resilient, vinyl composition tile, 12" x 12", 1/16" thick, marbleized
7150 Resilient, vinyl composition tile, 12" x 12", 1/16" thick, solid
Pass 1
Phase
Item
Description
Quantity
Unit
1 02225.380 0400 Flooring demo, carpet, bonded, including surface scraping sf
2 09658.100 7000 Resilient, vinyl composition tile, 12" x 12", 1/16" thick sf
3

Figure 37: Item Grid

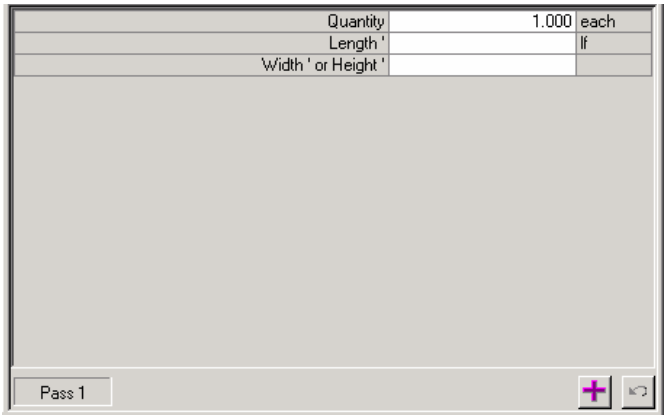


Figure 38: Dimensions Pane

7. Click on the white cell next to the Length'. Enter **40** and press the Tab key.

8. Enter **25** for the Width' or Height' variable.

9. Hit the Pass button so CESS calculates the quantities for the items in the Item Grid. The Item Grid pane should look like the following.

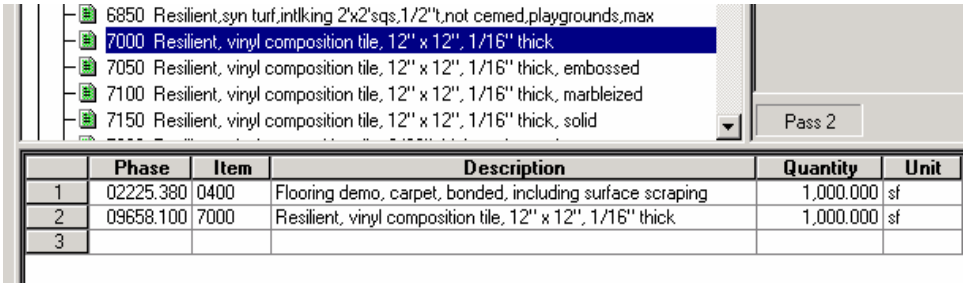

6850 Resilient,syn turf,intlking 2'x2'sqs,1/2"t,not cemed,playgrounds,max
7000 Resilient, vinyl composition tile, 12" x 12", 1/16" thick
7050 Resilient, vinyl composition tile, 12" x 12", 1/16" thick, embossed
7100 Resilient, vinyl composition tile, 12" x 12", 1/16" thick, marbleized
7150 Resilient, vinyl composition tile, 12" x 12", 1/16" thick, solid
Pass 2
Phase
Item
Description
Quantity
Unit
1 02225.380 0400 Flooring demo, carpet, bonded, including surface scraping 1,000.000 sf
2 09658.100 7000 Resilient, vinyl composition tile, 12" x 12", 1/16" thick 1,000.000 sf
3

Figure 39: Item Grid Pane

One advantage that Item Takeoff offers over Quick Takeoff is that users can work with the selected items and quantities prior to adding them to the spreadsheet.

10. Click the **OK** button to add the items to the spreadsheet. Now the item screen is still showing but the Item Grid is blank again. It is waiting for you to add another item. The spreadsheet is being created behind this Item Grid screen.

> CAUTION Users may not see the spreadsheet where the changes are occurring if the Item take-off screen is maximized.

11. When finished adding items, click the **Close** button to close the Item Takeoff window. At this point, users can now view the spreadsheet.

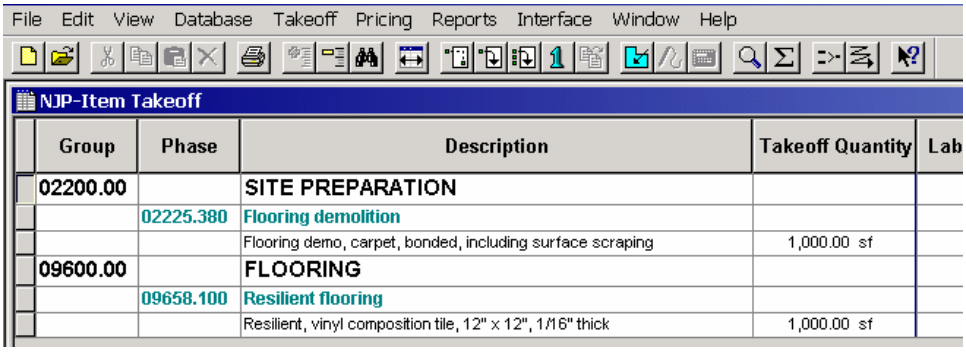


Figure 40: Item Takeoff Spreadsheet

Student Exercise: Item Takeoff

- Experiment with Item Takeoff using the various Navigation and Selection options discussed in the Quick Takeoff exercise.
- Consider the following:
  - Try to add Resilient Base, Cove, rubber, or vinyl items.
    Hint: Phase 09651.200 1150 Resilient Flooring
  - Does the floor surface require any underlayment?
  - Will you need adhesive to secure the new flooring?
- Experiment with changing (overriding) quantities in the Item Grid.
- Experiment with the calculator when quantifying items in the Item Grid.

Removing an Item from the Item Grid

If a user wants to remove an item from the Item Grid, perform the following steps.

a. Go to the far left square on the line to be deleted.
b. Left-click on the box containing the row number to highlight that line, then hit the Delete key.
c. A pop up box will ask you if you're sure you want to delete the row. Hit OK, and the line will disappear.

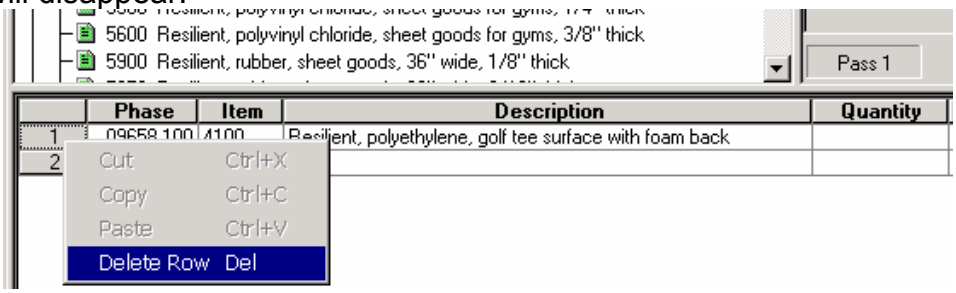


Figure 41: Removing an Item from the Item Grid

The line item will be removed from the Item Grid and, thus, will not be added to the spreadsheet.

See **Advanced CESS Topics** to learn how to remove items from the spreadsheet.

Assembly Takeoff: Repair a Rut in a Remote (Backcountry) Trail

As mentioned earlier, an assembly is a collection of items needed to complete a particular unit of work. Assemblies enable you to take off multiple items with a single operation. Another advantage is that you can obtain a cost per unit for a group of items. Much like Item Takeoff, you can review items and modify them for use in the current estimate before generating them to the spreadsheet.

Since.assemblies combine all the items you need for a particular project, and you can locate the appropriate assembly based on the sub-component of the equipment/feature of the work order, you should use assemblies whenever possible when you perform a cost estimate. Otherwise, each item to be included must be located independently, which increases the threat of accidentally omitting an item.

1. Repeat the Getting Started process on page 99.

   Enter the exercise file name as 'Your Initials-Assembly Takeoff'
   Example: **NJP-Assembly Takeoff**

2. From the spreadsheet, click the Assembly Takeoff button to open the Assembly Takeoff window.

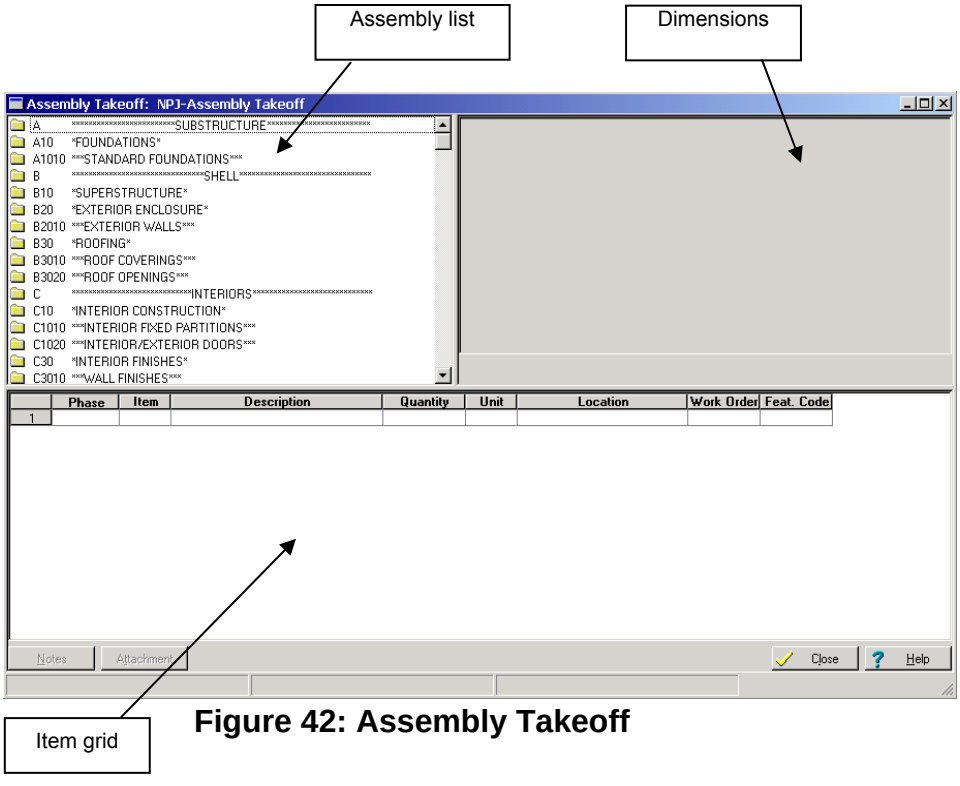


Figure 42: Assembly Takeoff

- The Assembly List pane displays assemblies from the database. This works just like the Quick or Item Takeoff window including most of the navigation and selection options. Note that you can only select one assembly at a time (except that you cannot just type in a letter, such as 'G' and jump to that section).
- The Item Grid pane shows the items included in the assembly.
- The Dimensions pane displays formula variables or "questions" associated with the assembly that assist you in calculating quantities.

3. Navigate the Assembly List and locate Assembly **MG2040.930 N100 - Existing, Repair Tread Surface by HAND, Unpaved Natural Surface**. Double-click to select it.

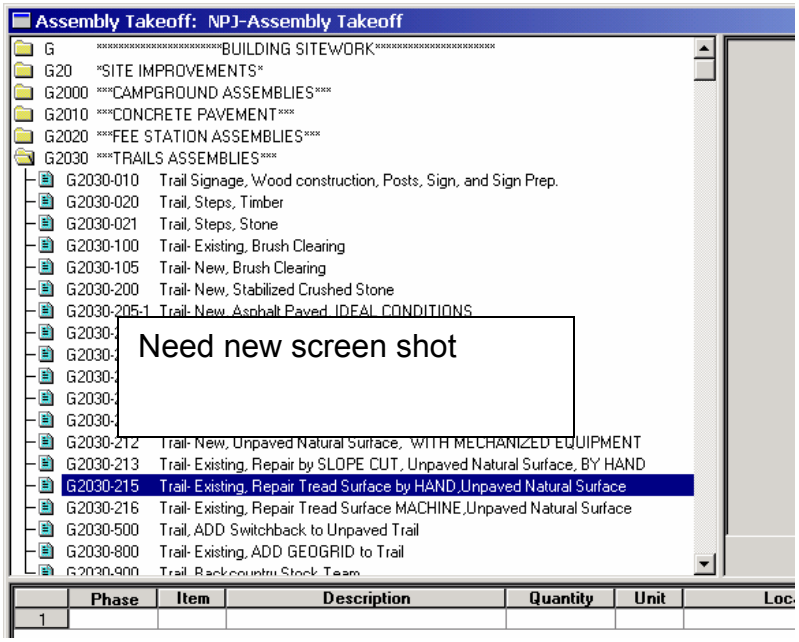

Assembly Takeoff: NPJ-Assembly Takeoff
G **********BUILDING SITEWORK**********
G20 *SITE IMPROVEMENTS*
G2000 ***CAMPGROUND ASSEMBLIES***
G2010 ***CONCRETE PAVEMENT***
G2020 ***FEE STATION ASSEMBLIES***
G2030 ***TRAILS ASSEMBLIES***
G2030-010 Trail Signage, Wood construction, Posts, Sign, and Sign Prep.
G2030-020 Trail, Steps, Timber
G2030-021 Trail, Steps, Stone
G2030-100 Trail- Existing, Brush Clearing
G2030-105 Trail- New, Brush Clearing
G2030-200 Trail- New, Stabilized Crushed Stone
G2030-205-1 Trail- New, Asphalt Paved, IDEAL CONDITIONS
Need new screen shot
G2030-212 Trail- New, Unpaved Natural Surface, WITH MECHANIZED EQUIPMENT
G2030-213 Trail- Existing, Repair by SLOPE CUT, Unpaved Natural Surface, BY HAND
G2030-215 Trail- Existing, Repair Tread Surface by HAND,Unpaved Natural Surface
G2030-216 Trail- Existing, Repair Tread Surface MACHINE,Unpaved Natural Surface
G2030-500 Trail, ADD Switchback to Unpaved Trail
G2030-800 Trail- Existing, ADD GEOGRID to Trail
Phase
Item
Description
Quantity
Unit
1

Figure 43: Assembly Takeoff for a Trail

4. The five items linked to the assembly will immediately appear on the Item Grid, and the formula variables will appear in the Dimensions pane.

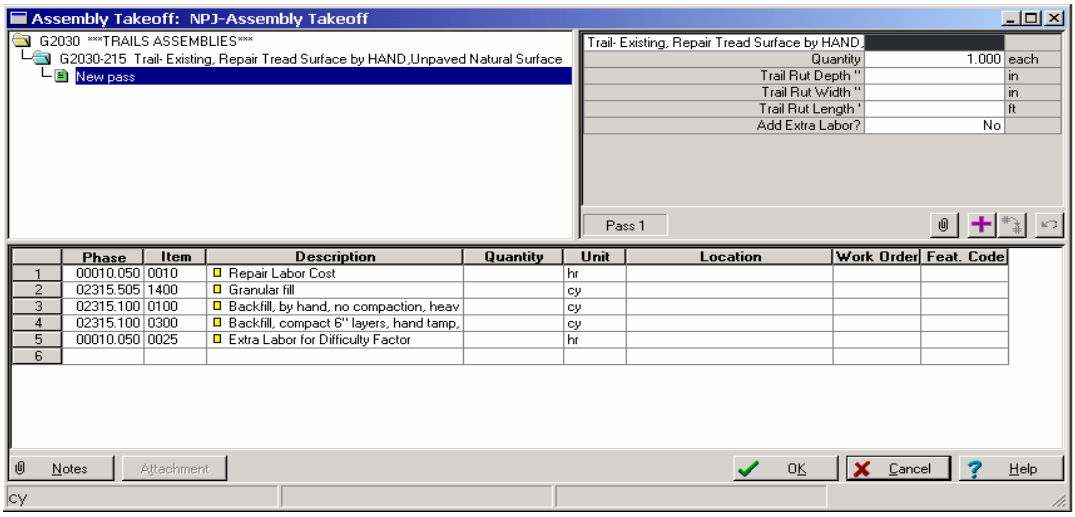

Assembly Takeoff: NPJ-Assembly Takeoff
G2030 ***TRAILS ASSEMBLIES***
G2030-215 Trail- Existing, Repair Tread Surface by HAND,Unpaved Natural Surface
New pass
Trail- Existing, Repair Tread Surface by HAND
Quantity 1.000 each
Trail Rut Depth " in
Trail Rut Width " in
Trail Rut Length ' ft
Add Extra Labor? No
Pass 1
Phase Item Description Quantity Unit Location Work Order Feat. Code
1 00010.050 0010 Repair Labor Cost hr
2 02315.505 1400 Granular fill cy
3 02315.100 0100 Backfill, by hand, no compaction, heav cy
4 02315.100 0300 Backfill, compact 6" layers, hand tamp, cy
5 00010.050 0025 Extra Labor for Difficulty Factor hr
6
Notes
Attachment
OK
Cancel
Help
CY

Figure 44: Dimensions Pane

The next step is to calculate the quantities for these items. The Dimensions pane displays variables (questions, parameters, etc.) that assist in calculating item quantities in the Item Grid.

5. Click on the white cell next to the Trail Rut Depth. Enter **12** and press the Tab key.

6. Enter **18** for the Trail Rut Width variable and press the Tab key.

7. Enter **100** for the Trail Rut Length variable and press the Tab key.

8. Enter **Y** for the Add Extra Labor? variable and press the Tab key.

9. Enter **4** for the Hours of Extra Labor variable.

10. Hit the Pass button (the plus sign). CESS calculates the quantities for the items in the Item Grid. The Item Grid pane should look like the following. Note the assembly unit costs at the bottom of the Assembly Takeoff window.

CAUTION Be aware that if you press the Enter key on the last variable of a dimension pane, it automatically creates a pass. If you then hit the pass button, you will double the quantities in the takeoff estimate.

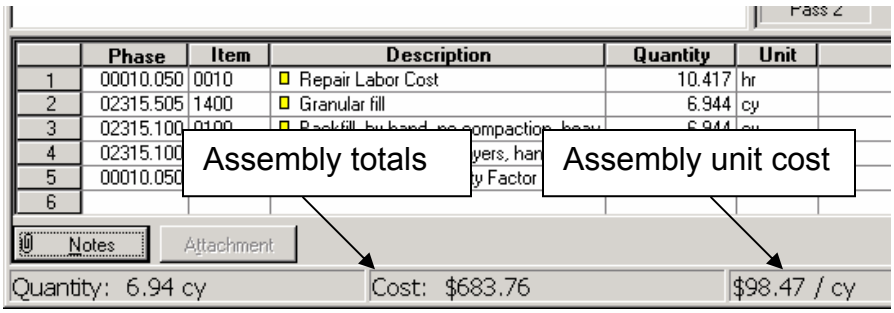


Figure 45: Assembly Takeoff Window

NOTE:

- Be sure to customize assembly takeoffs by deleting items in the item grid that may not apply to your operation.
- Always review the item quantities in the Item Grid after entering values in the Dimension panel.

> CAUTION Be aware that if you accidentally hit the pass button twice, you will double the quantities. To undo, hit the Undo Last Pass button to the far right of the Pass button.

Assembly Takeoff allows users to modify the selected items and quantities prior to adding them to the spreadsheet. Users can also make changes to the Dimension pane before hitting the Pass button.

11. Click the OK button to add these items to the spreadsheet. Click the Close button to close the Assembly Takeoff window.

The spreadsheet should look like the screen below.

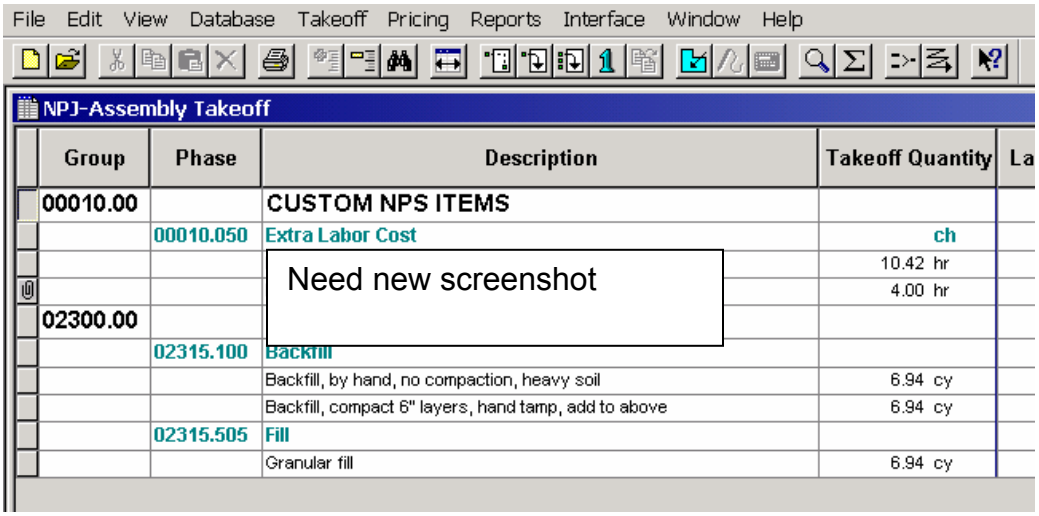


Figure 46: Assembly Takeoff Spreadsheet

Student Exercise: Assembly Takeoff

- This cost database contains hundreds of NPS-specific assemblies and thousands of R.S. Means assemblies. Using the WBS information on your equipment/feature record in FMSS will direct you to the right assembly. Review the Uniformat II specification in the Resources section if you need additional information.
- Experiment with Assembly Takeoff using various Navigation and Selection options.
- Consider the following:
  - Try to add an assembly to replace eight (8) timber steps for the same trail.
    Hint: Assembly G2040.930-N020
  - Try to add multiple assemblies for a campground, including campsite pad, picnic tables, trash and recycle containers, and a fire ring.
- Experiment with changing (overriding) quantities in the Item Grid.

ESTIMATING FACTORS FOR THE NATIONAL PARK SERVICE (ADD-ONS)

Before beginning the steps to complete a Cost Estimate, a discussion of add-ons below will serve as an introduction to explain variables that affect pricing projects.

Add-ons are assumptive conditions that drive costs for cost estimated projects. In the NPS, there are five different factors that must be considered when developing a cost estimate for a particular project. These factors must be added on to the estimate to ensure that an estimate is as accurate as possible.

The following list identifies the estimating factors that will influence the cost data. NPS estimating factors will default automatically to settings identified below; the percentage can be adjusted manually, if conditions warrant.

- Historic Preservation Factor (variable 0-100%, defaults to 0%)
- Design Contingency (variable 0-20%, defaults to 20%)
- Overhead (variable 0-20%, defaults to 15%)
- Profit (variable 0-20%, defaults to 12%)
- General & Administrative [a.k.a. General Requirements] (variable 4-20%, defaults to 15%)

Historic Preservation Factor defaults to 0%, but can be increased up to 100%, dependent upon the level of historic techniques and materials required.

Design contingency is discussed earlier in this chapter. For a Class C estimate, design contingency defaults to 20%. The CESS program automatically factors design contingency into the cost estimate. For projects using existing design, this factor may be reduced.

Overhead are the costs that a contractor has for doing business. A general contractor has expenses not directly related to the construction of a project but which are vital to the contractor's business operations. These include fixed overhead (Federal and State Unemployment costs, Social Security Tax, Builder's Risk Insurance and Public Liability Costs) and variable overhead (Worker's Compensation Insurance, Main Office Overhead, etc.). In CESS, overhead costs default to 15%. It may adjust up to 20% or down to 0%.

Profit percentage is variable on the size of the job and a contractor's annual billing. Contractors generally take more profit on a smaller job. However, in CESS, profit defaults to 12% and may be adjusted up to 20% or down to 0%.

General & Administrative (a.k.a., general requirements) are the costs to the government from the contractor that are the cost items defined in the Division 1 specifications for a project. Sometimes some Division 1 items (Profit, Overhead) are included in the cost of individual bid items when preparing an estimate. The following

items are costs that the contractor passes on to the NPS through bid items; these are indirect costs of the construction of the project.

- Administrative Requirements (Permits, Bonds, Scheduling, Submittals)
- Quality Requirements (Testing, Sampling)
- Temporary Facilities (Utilities, Trailers, Scaffolding, Tarpaulins, Barricades, Fences, Signs)
- Equipment Rental
- Cleaning
- Commissioning (As-Builts, Punchlists, Training O&M Manuals)

NPS pays for these even though they are lumped into the contractor's individual bid items. They run from 4 to 20 percent depending on the size, location, and complexity and other variables of the project and estimate. CESS will default to 15% and may be adjusted up to 20% or down to 4%.

NOTE: Overhead, profit, and general & administration are reflected in FMSS as Service Cost.

CCI factor is a CESS City Cost Index feature located in the Estimate Information screen. This percentage is variable dependent on your park location and does not appear in the totals screen.

USING CESS: THE COST ESTIMATING PROCESS

Steps to Complete a Cost Estimate for a Work Order Deficiency

This guide assumes that users are in FMSS and are ready to estimate a work order for correcting deficiencies identified in the condition assessment. NPS employees will learn how to create a deficiency work order in the next chapter but the following steps assume that you are in FMSS and have a work order open on your computer screen.

For training purposes you will have to open an estimate, name it and identify the estimator, and then CESS will open to an empty spreadsheet as shown in Figure 47.

NOTE: The NPSDUAL line on your spreadsheet will reflect which cost database the estimate is using. For example, in the screenshot below it is using the 2004 cost database.

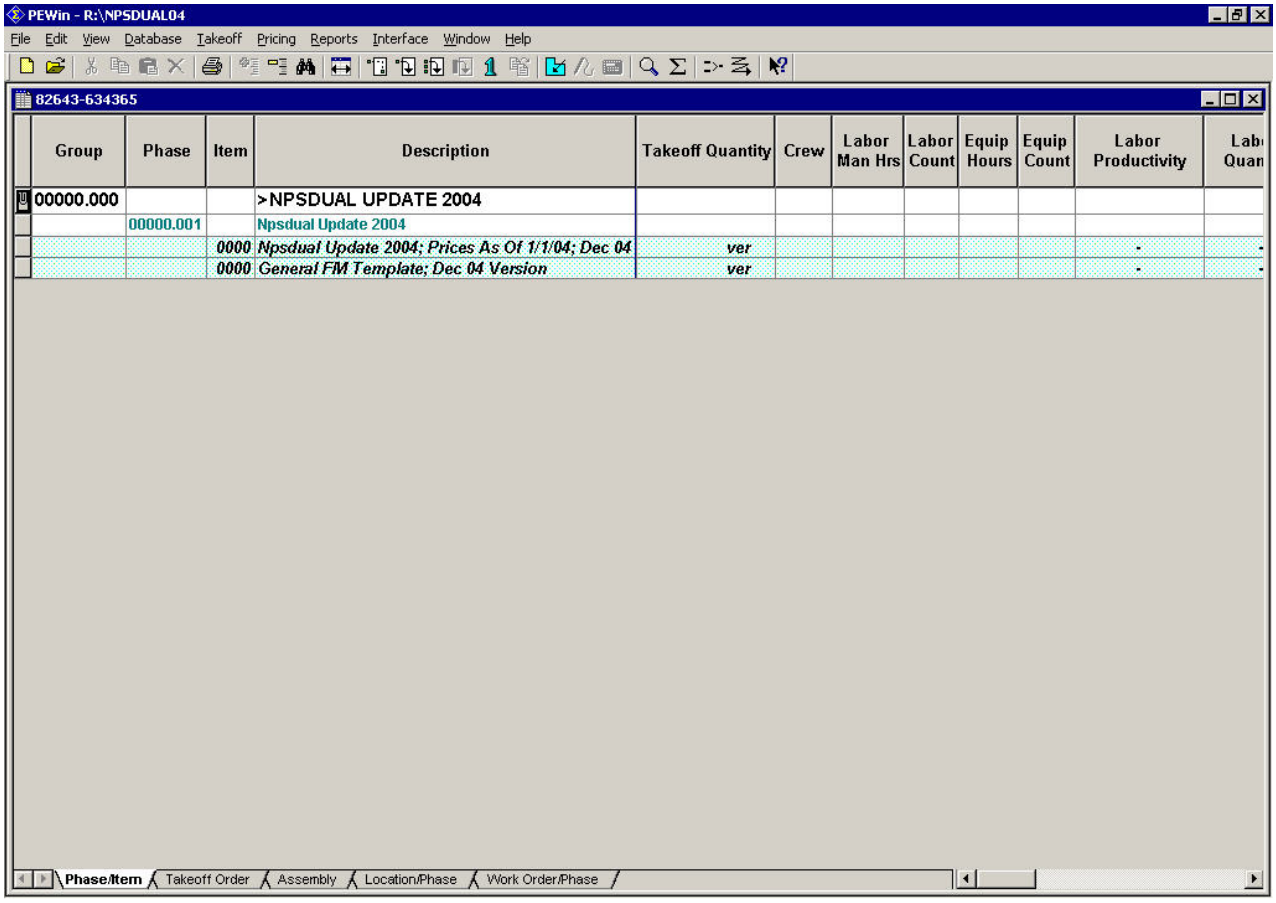


Figure 47: Empty Spreadsheet

1. Click on the 'CESS Estimate' button on the work order Cost Tab screen. The system will start CESS, create the estimate file, and display the empty spreadsheet.

The new estimate file is named “Location/Asset number—work order number”. For example: 3334-12345

2. Perform takeoff by copying items into the estimate spreadsheet using any or all of the takeoff methods described in the exercises:
   - Quick Takeoff
   - Item Takeoff
   - Assembly Takeoff

The best and fastest way to copy items to the spreadsheet is to use Assembly Takeoff. If you need to add more items to the estimate, try using Quick Takeoff or Item Takeoff.

3. Review the list of items on the spreadsheet to ensure that you have the correct data.
   a. Review each item as it relates to the intended corrective action.
   b. Review each item for reasonable quantity. Adjust quantities, if necessary.
   c. Add or delete items as necessary and appropriate (see Advanced CESS topics).

   NOTE: DO NOT modify costs or crews on the items! See the Validation section below for details.

4. Click on the button to review the total estimate cost. The Totals window will appear.

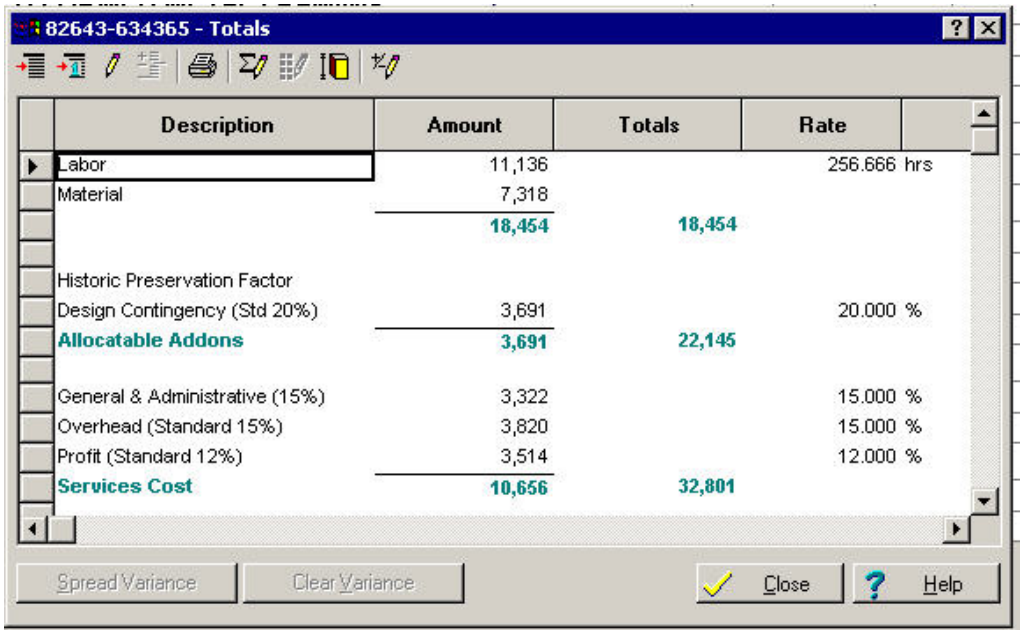


Figure 48: Totals Window

   a. Review the estimate totals to ensure that the costs are reasonable and that they make sense for the project.

b. **FOR CLASSROOM TRAINING ONLY**: Select add-on button and choose at a minimum Historic Preservation Factor, Design Contingency, Overhead, Profit, and General & Administrative as add-ons to your estimate.

c. If necessary, go back to the spreadsheet to add or delete items and/or make adjustments to the item quantities.

d. Review the Totals window again after you have completed all changes. Close the window.

Users have now completed the deficiency work order estimate and the CESS process, and are ready to update FMSS with a CESS cost estimate.

Updating FMSS from CESS

1. After the final review of the estimate, close the estimate by clicking the upper in the upper right-hand corner. The screen will look like one of the images below, depending on whether or not you have maximized the estimate.

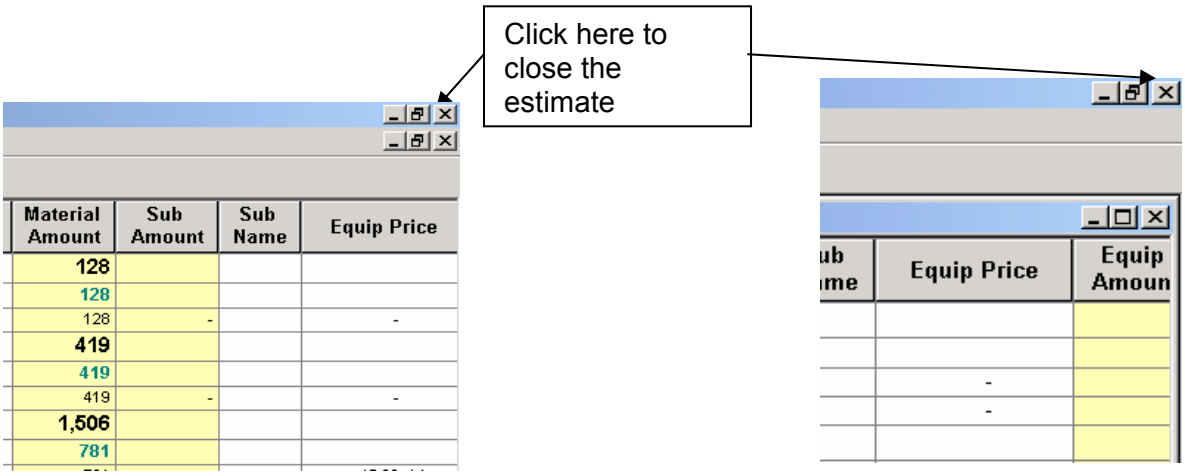


Figure 50: Closing the Estimate

2. The system prompts you to transfer the data from the CESS estimate to the associated FMSS deficiency work order.

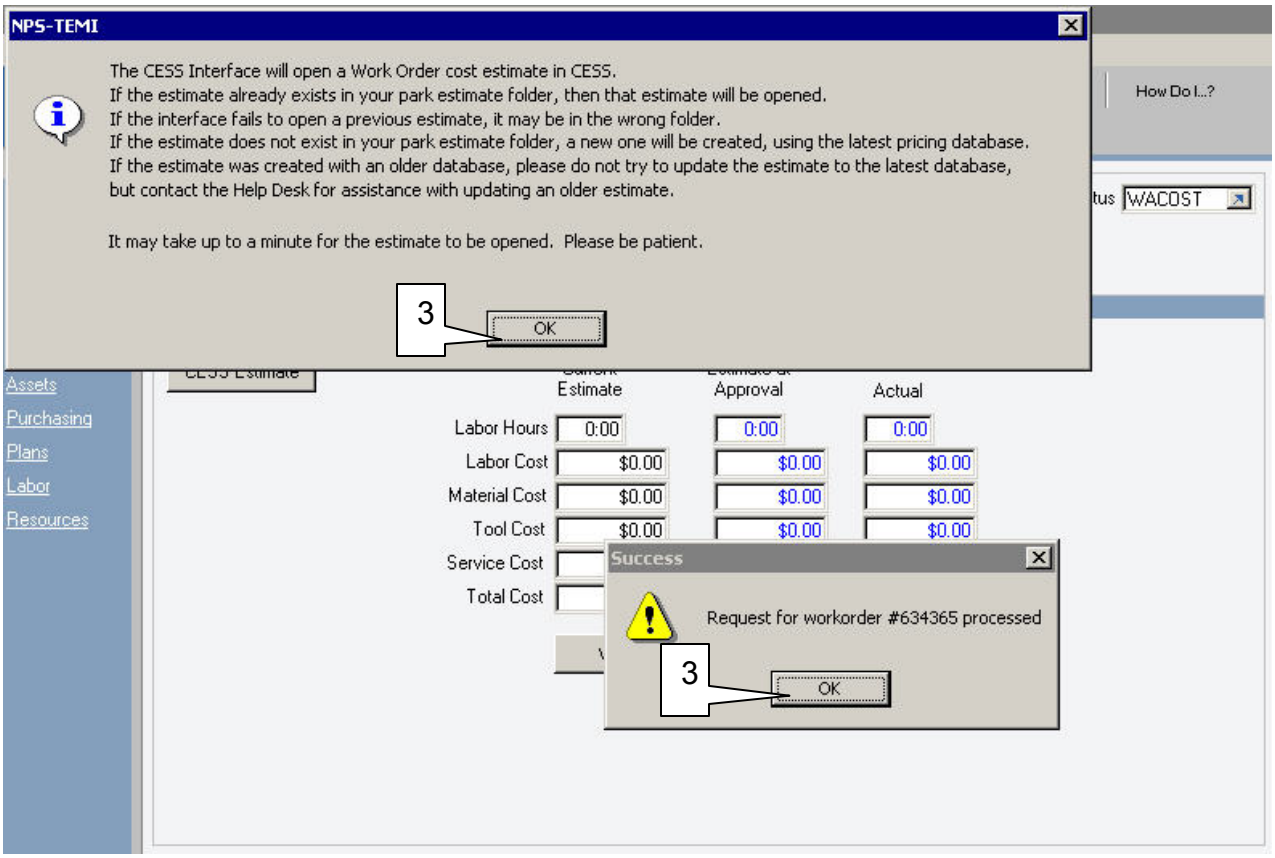

NPS-TEMI
The CESS Interface will open a Work Order cost estimate in CESS.
If the estimate already exists in your park estimate folder, then that estimate will be opened.
If the interface fails to open a previous estimate, it may be in the wrong folder.
If the estimate does not exist in your park estimate folder, a new one will be created, using the latest pricing database.
If the estimate was created with an older database, please do not try to update the estimate to the latest database, but contact the Help Desk for assistance with updating an older estimate.
It may take up to a minute for the estimate to be opened. Please be patient.
3
OK
How Do I...?
WACOST
Assets
Purchasing
Plans
Labor
Resources
Estimate
Approval
Actual
Labor Hours
Labor Cost
Material Cost
Tool Cost
Service Cost
Total Cost
Success
Request for workorder #634365 processed
3
OK

Figure 51: Closed Estimate Windows

3. Select **OK** on both the NPS TEMI window and the Success window.

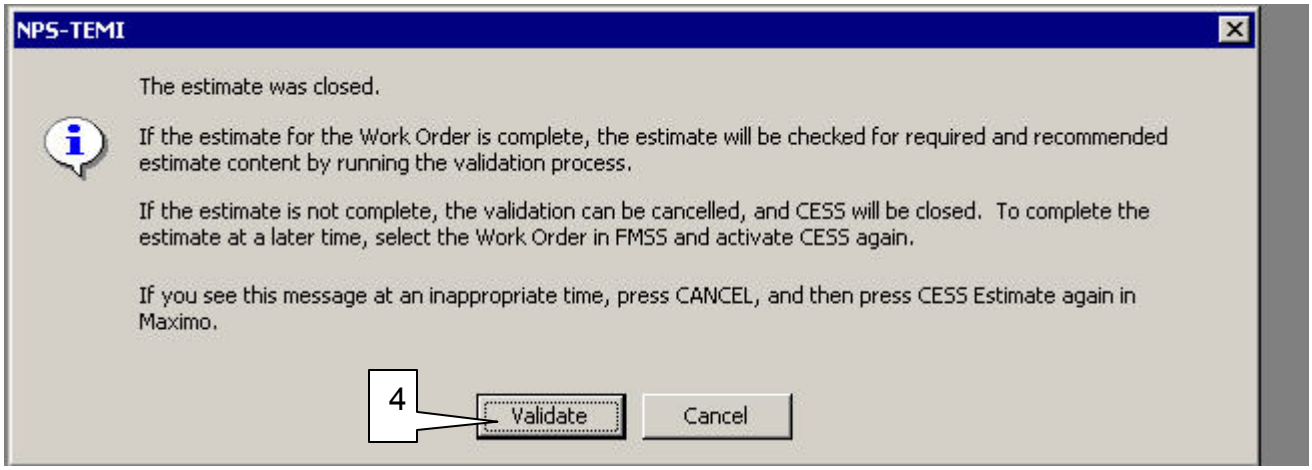

NPS-TEMI
The estimate was closed.
If the estimate for the Work Order is complete, the estimate will be checked for required and recommended estimate content by running the validation process.
If the estimate is not complete, the validation can be cancelled, and CESS will be closed. To complete the estimate at a later time, select the Work Order in FMSS and activate CESS again.
If you see this message at an inappropriate time, press CANCEL, and then press CESS Estimate again in Maximo.
4
Validate
Cancel

Figure 52: Validation Window

4. A validation window will appear. Select **Validate**.

5. You will be returned to your FMSS work order. It may take a few seconds or up to 30 minutes for the estimate update window to appear. The delay is due to system load.

> **CAUTION** Do not change FMSS work order status until the work order has been refreshed with the new CESS estimate.

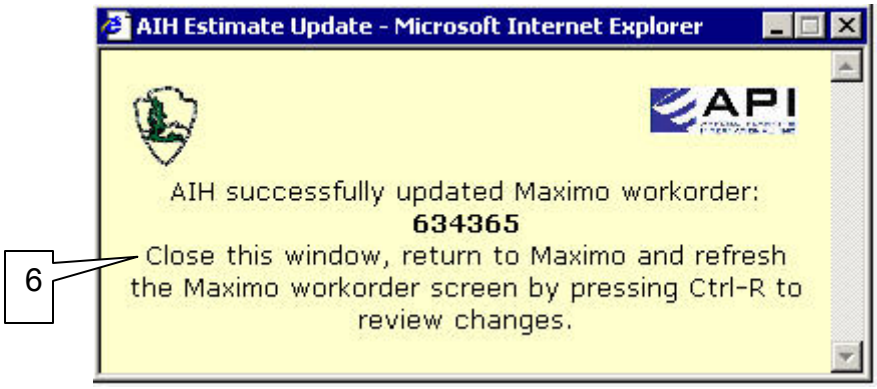

AIH Estimate Update - Microsoft Internet Explorer
API
AIH successfully updated Maximo workorder:
634365
Close this window, return to Maximo and refresh the Maximo workorder screen by pressing Ctrl-R to review changes.
6

Figure 53: Estimate Update Window

6. After you have received your estimate update window, showing a successful data transfer, you will need to refresh your work order.

Validation Warnings and Errors

When the system detects changes to the add-ons in the estimate, within the approved range, the system displays the following warning message:

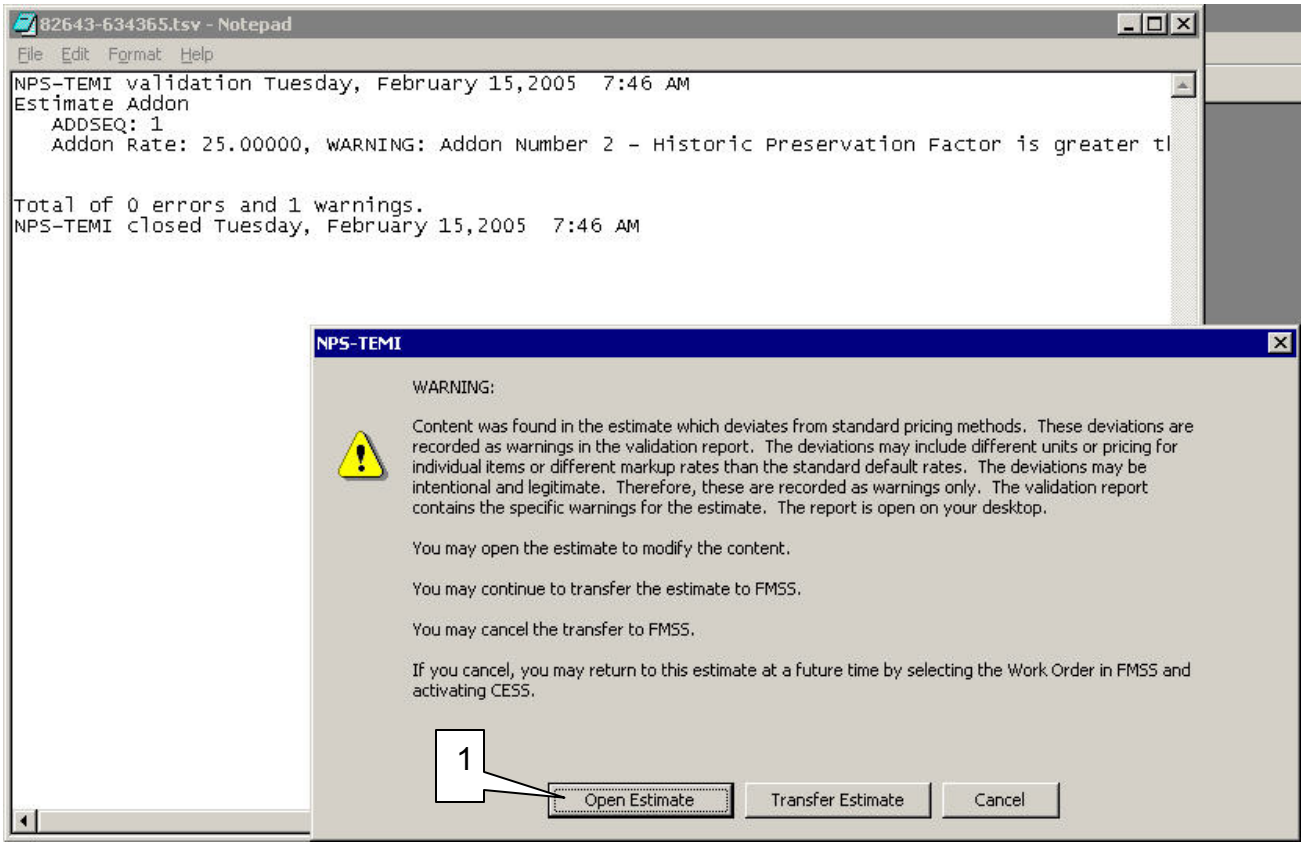

82643-634365.tsv - Notepad
File Edit Format Help
NPS-TEMI validation Tuesday, February 15,2005 7:46 AM
Estimate Addon
ADDSEQ: 1
Addon Rate: 25.00000, WARNING: Addon Number 2 - Historic Preservation Factor is greater tl
Total of 0 errors and 1 warnings.
NPS-TEMI closed Tuesday, February 15,2005 7:46 AM
NPS-TEMI
WARNING:
Content was found in the estimate which deviates from standard pricing methods. These deviations are recorded as warnings in the validation report. The deviations may include different units or pricing for individual items or different markup rates than the standard default rates. The deviations may be intentional and legitimate. Therefore, these are recorded as warnings only. The validation report contains the specific warnings for the estimate. The report is open on your desktop.
You may open the estimate to modify the content.
You may continue to transfer the estimate to FMSS.
You may cancel the transfer to FMSS.
If you cancel, you may return to this estimate at a future time by selecting the Work Order in FMSS and activating CESS.
1
Open Estimate
Transfer Estimate
Cancel

Figure 54: Validation Warning Window

NPS employees *must* fix the errors prior to transferring the estimate cost data to FMSS.

1. Click **Open Estimate** on the Validation Warning Window. DO NOT select Transfer Estimate at this point, unless the only error or warning is that an add-on is within the acceptable range, but not the default.

2. Locate the item that is identified on the error list.

3. Change the value identified on the error list to the **correct value**.

Repeat steps 2 and 3 until all errors and/or warnings have been fixed.

The following changes to the item cost data are not allowed:

- Units of measure
- Unit prices and amounts
- Crews and resources
- Waste factors
- Productivities or conversion factors

The following changes to the add-on cost data (except for the Historic Preservation factor) are not allowed:

- Rates and amounts
- Inserting duplicate add-ons

NOTE: If a warning is not corrected and the estimate is transferred, these estimates will be documented in a report for management review.

Proper use of the CESS will result in consistent cost estimates using standardized cost data across the entire National Park Service.

How to Fix Errors

If a user has made changes to the cost data, the system will create an error report with the same name as the estimate (except with a .tsv extension).

A sample of the error report is shown below.

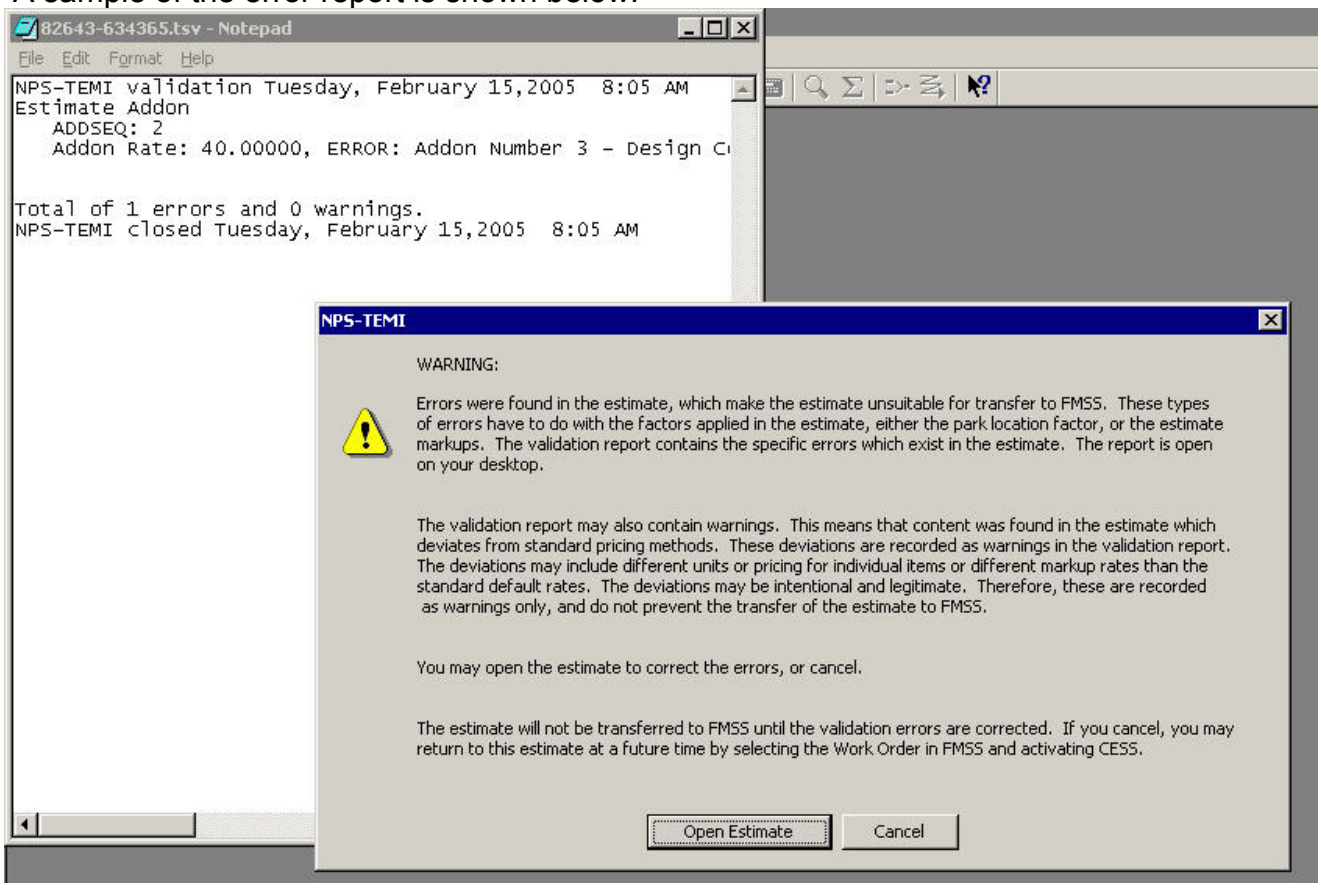

82643-634365.tsv - Notepad
File Edit Format Help
NPS-TEMI validation Tuesday, February 15,2005 8:05 AM
Estimate Addon
ADDSEQ: 2
Addon Rate: 40.00000, ERROR: Addon Number 3 - Design C
Total of 1 errors and 0 warnings.
NPS-TEMI closed Tuesday, February 15,2005 8:05 AM
NPS-TEMI
WARNING:
Errors were found in the estimate, which make the estimate unsuitable for transfer to FMSS. These types of errors have to do with the factors applied in the estimate, either the park location factor, or the estimate markups. The validation report contains the specific errors which exist in the estimate. The report is open on your desktop.
The validation report may also contain warnings. This means that content was found in the estimate which deviates from standard pricing methods. These deviations are recorded as warnings in the validation report. The deviations may include different units or pricing for individual items or different markup rates than the standard default rates. The deviations may be intentional and legitimate. Therefore, these are recorded as warnings only, and do not prevent the transfer of the estimate to FMSS.
You may open the estimate to correct the errors, or cancel.
The estimate will not be transferred to FMSS until the validation errors are corrected. If you cancel, you may return to this estimate at a future time by selecting the Work Order in FMSS and activating CESS.
Open Estimate
Cancel

Figure 55: Error Report

The error report displays the following information:

- The type of error (item, add-on, or estimate information data)
- The item that contains one or more errors (listed by Phase, item and takeoff sequence)
- The field on the item that contains the specific error
- A description of the error
- The correct value from the CESS database (if applicable)

Correcting a Blank CESS Description Field

The Timberline software allows for blank description in the estimate field. When copying from an assembly, the blank can be created either by the user or by the software itself. Both scenarios are very infrequent, but each can happen.

The FMSS / CESS interface, however, is expecting a non-blank description field for the insertion into the Maximo oracle tables; sending a blank description field from the estimate to the work order will cause the interface queue to stall, preventing all estimates from being processed to the work orders. To avoid this problem, the system has been programmed to capture the blank description and insert **No description provided in Timberline Estimate** into the work order “op step” description field.

When this occurs, you will need to correct the blank description in the estimate. The steps for doing so are as follows:

1. Review the work order and select the material tab. This will display the phase item from the estimate, with the blank description referencing the “op step”. The example below shows a blank description in the estimate for “op step” 10.

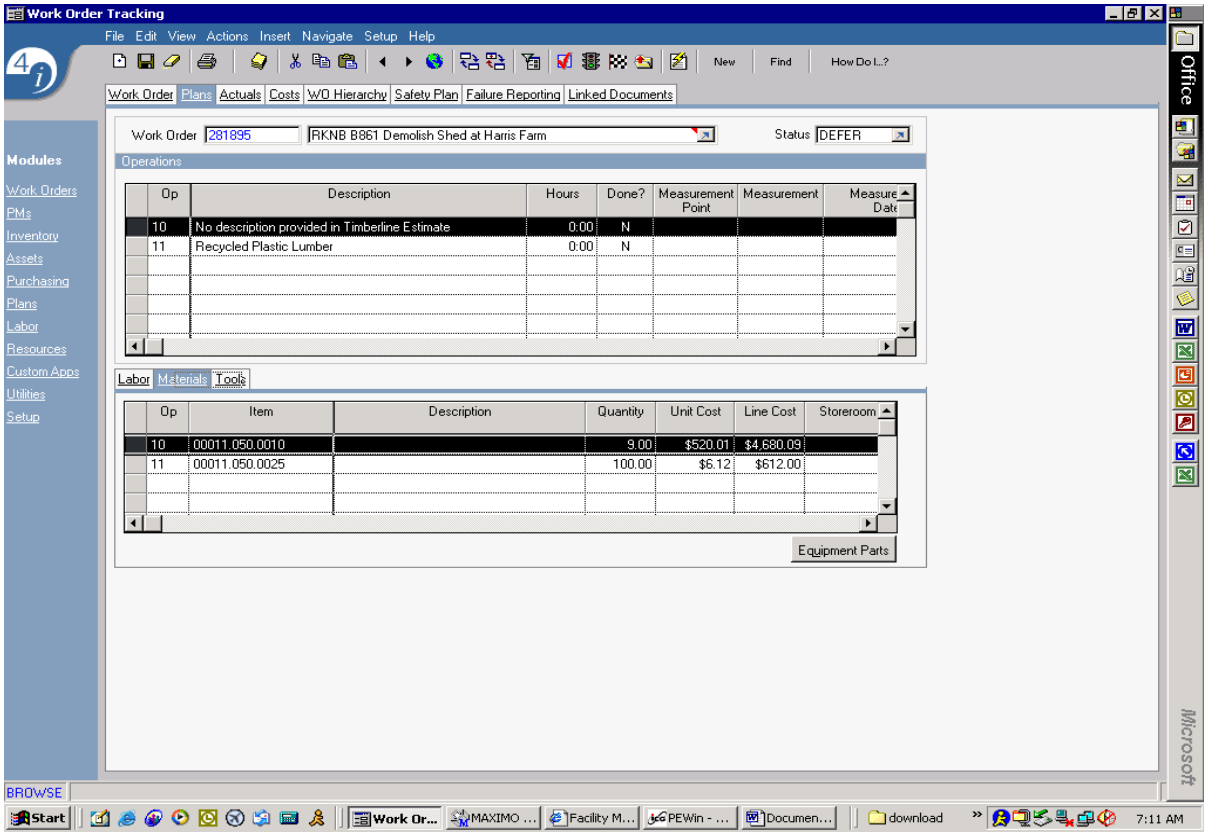


Figure 56: Blank Description for Op Step 10

2. Enter CESS via the interface, which will retrieve the estimate. If the estimate contains a large amount of assemblies, use the search engine (binocular icon) to find the phase item. After entering the phase item, select GO. This will return you to the assembly that has the blank description.

NOTE: Use the copy function (right mouse click) from the work order material tab on the phase item and paste into the search engine or key entry the phase number.

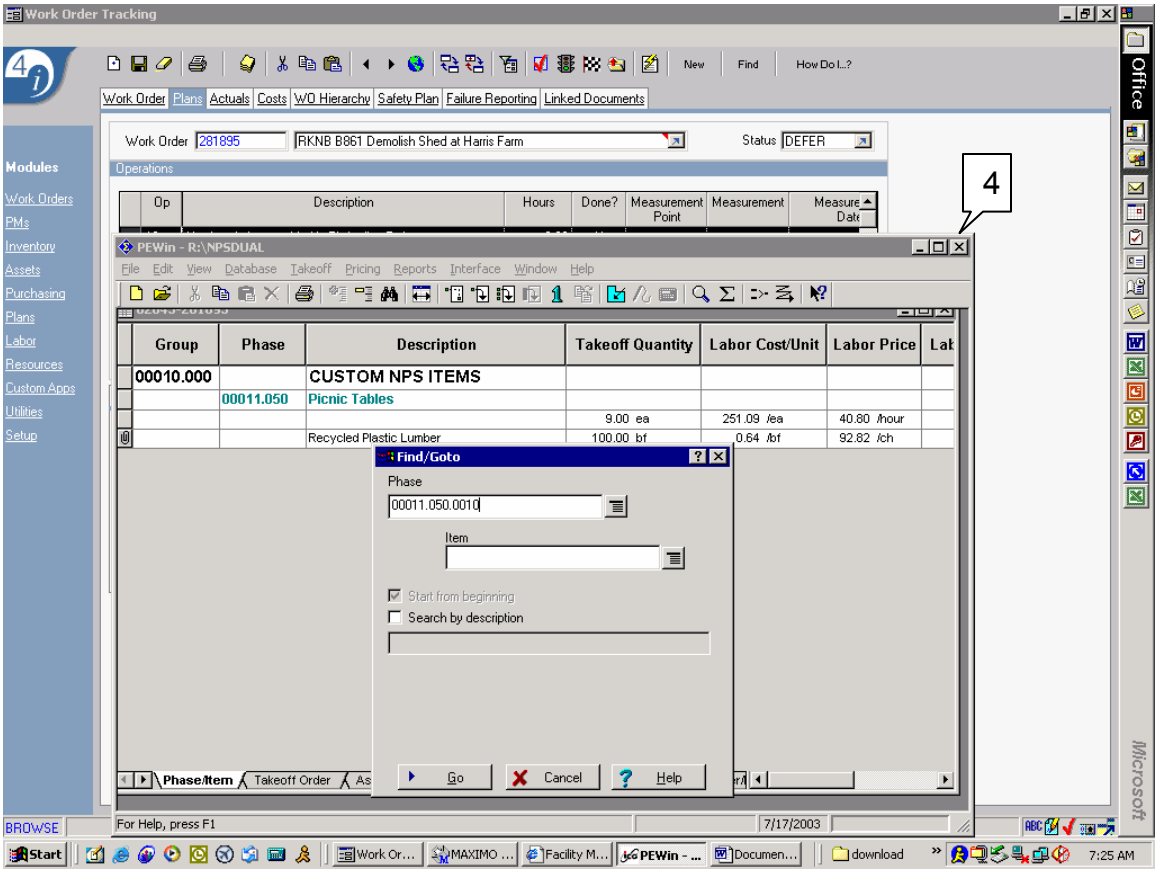


Figure 57: Finding the Phase Item

3. Correct the blank description, either by copy-pasting the description from the assembly or by deleting the line item, using Quick Takeoff and re-entering the line item detail.

4. Close the estimate. The interface will update the work order.

ADVANCED CESS TOPICS

Recalling the Dimension Pane in CESS

An estimate should be reviewed in order to validate the measurements selected, particularly if the estimate seems too high or too low. If the values are found to be incorrect, they will need to be modified. To review the quantities selected for an assembly pass, open the estimate.

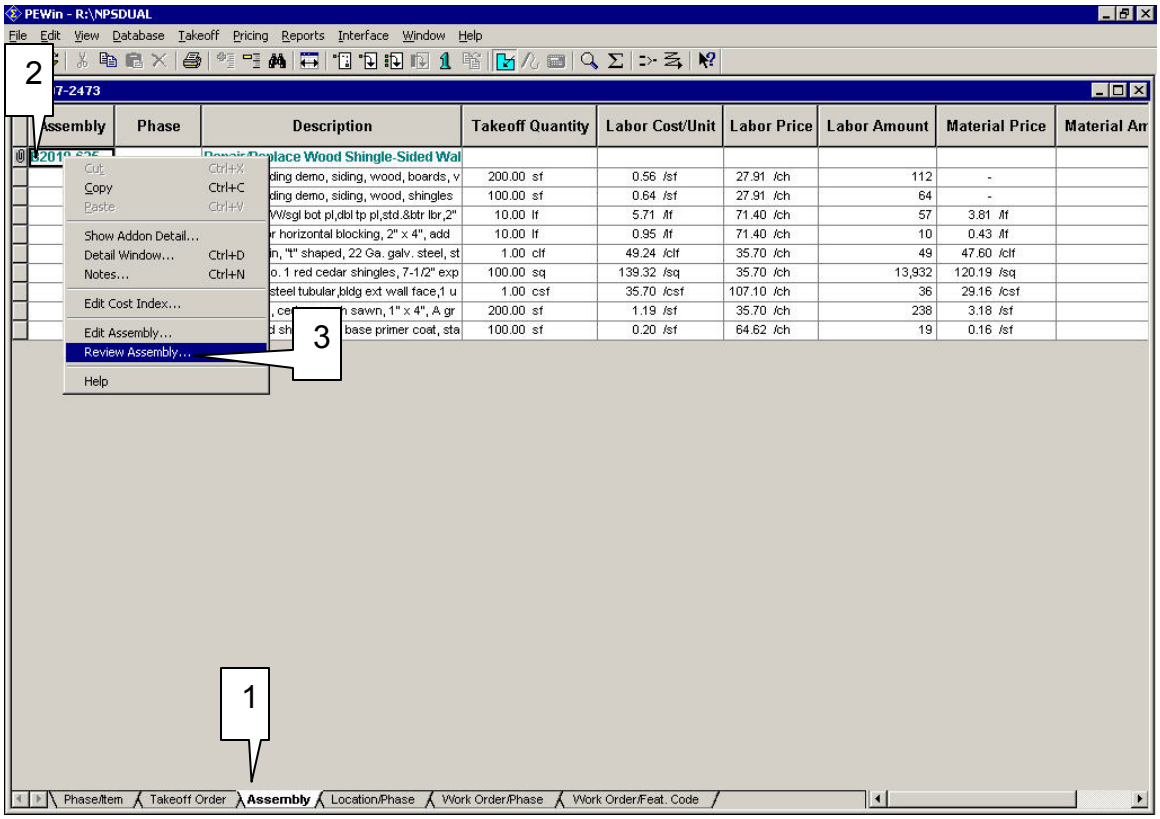


Figure 58: Dimension Pane Review

1. From the open spreadsheet, click on **Assembly** tab view.

2. Right-click on the assembly number in the first column.

3. Select the **Review Assemblies** choice in the drop down menu.

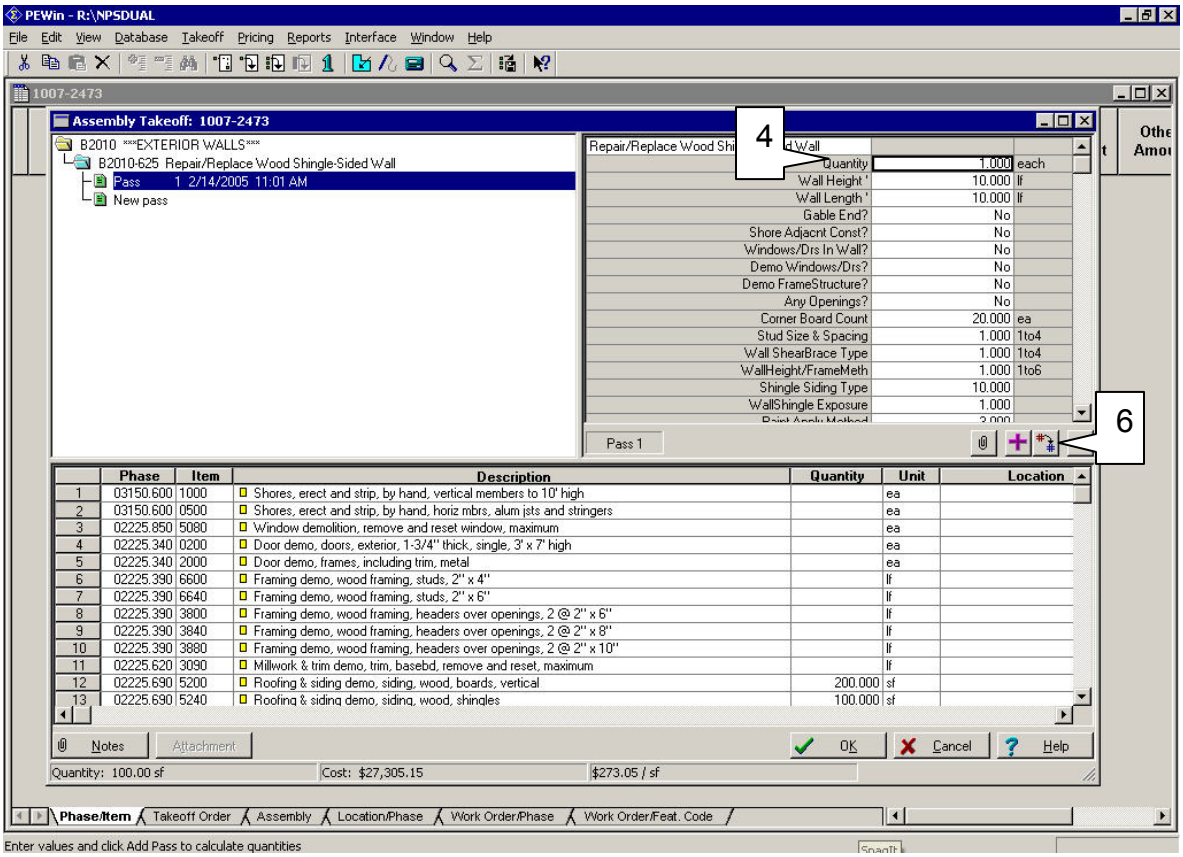

PEWin - R:\NPSDUAL
File Edit View Database Takeoff Pricing Reports Interface Window Help
1007-2473
Assembly Takeoff: 1007-2473
B2010 ***EXTERIOR WALLS***
B2010-625 Repair/Replace Wood Shingle-Sided Wall
Pass 1 2/14/2005 11:01 AM
New pass
4
Quantity 1.000 each
Wall Height ' 10.000 lf
Wall Length ' 10.000 lf
Gable End? No
Shore Adjacnt Const? No
Windows/Drs In Wall? No
Demo Windows/Drs? No
Demo FrameStructure? No
Any Openings? No
Corner Board Count 20.000 ea
Stud Size & Spacing 1.000 1to4
Wall ShearBrace Type 1.000 1to4
WallHeight/FrameMeth 1.000 1to6
Shingle Siding Type 10.000
WallShingle Exposure 1.000
Pass 1
6
Phase Item Description Quantity Unit Location
1 03150.600 1000 Shores, erect and strip, by hand, vertical members to 10' high ea
2 03150.600 0500 Shores, erect and strip, by hand, horiz mbrs, alum jsts and stringers ea
3 02225.850 5080 Window demolition, remove and reset window, maximum ea
4 02225.340 0200 Door demo, doors, exterior, 1-3/4" thick, single, 3' x 7' high ea
5 02225.340 2000 Door demo, frames, including trim, metal ea
6 02225.390 6600 Framing demo, wood framing, studs, 2" x 4" lf
7 02225.390 6640 Framing demo, wood framing, studs, 2" x 6" lf
8 02225.390 3800 Framing demo, wood framing, headers over openings, 2 @ 2" x 6" lf
9 02225.390 3840 Framing demo, wood framing, headers over openings, 2 @ 2" x 8" lf
10 02225.390 3880 Framing demo, wood framing, headers over openings, 2 @ 2" x 10" lf
11 02225.620 3090 Millwork & trim demo, trim, basebd, remove and reset, maximum lf
12 02225.690 5200 Roofing & siding demo, siding, wood, boards, vertical 200.000 sf
13 02225.690 5240 Roofing & siding demo, siding, wood, shingles 100.000 sf
Notes
Attachment
OK
Cancel
Help
Quantity: 100.00 sf
Cost: $27,305.15
$273.05 / sf
Phase/Item
Takeoff Order
Assembly
Location/Phase
Work Order/Phase
Work Order/Feat. Code
Enter values and click Add Pass to calculate quantities

Figure 59: Verify Dimensions

4. Verify the dimensions and totals used.

5. To change a dimension, you will need to “replace a pass” by highlighting the pass you would like to change. Change the necessary value(s).

6. Click the **Replace Pass** icon.

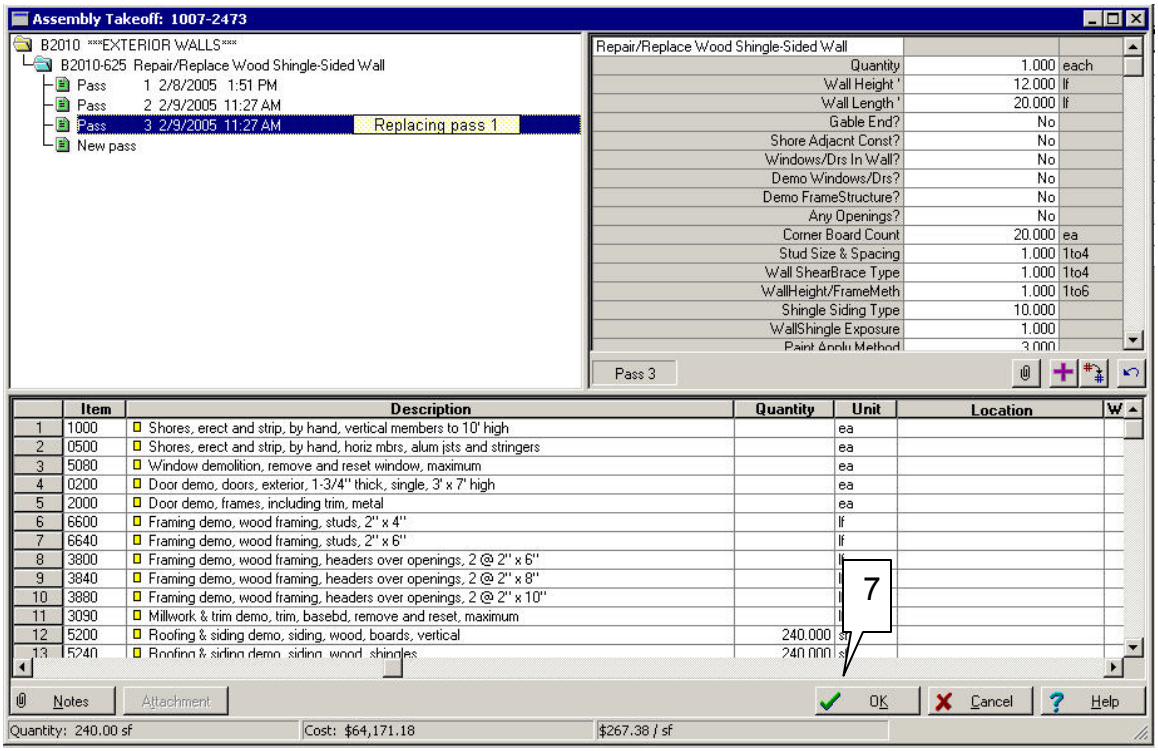

Assembly Takeoff: 1007-2473
B2010 ***EXTERIOR WALLS***
B2010-625 Repair/Replace Wood Shingle-Sided Wall
Pass 1 2/8/2005 1:51 PM
Pass 2 2/9/2005 11:27 AM
Pass 3 2/9/2005 11:27 AM
Replacing pass 1
New pass
Repair/Replace Wood Shingle-Sided Wall
Quantity 1.000 each
Wall Height ' 12.000 lf
Wall Length ' 20.000 lf
Gable End? No
Shore Adjacnt Const? No
Windows/Drs In Wall? No
Demo Windows/Drs? No
Demo FrameStructure? No
Any Openings? No
Corner Board Count 20.000 ea
Stud Size & Spacing 1.000 1to4
Wall ShearBrace Type 1.000 1to4
WallHeight/FrameMeth 1.000 1to6
Shingle Siding Type 10.000
WallShingle Exposure 1.000
Pass 3
Item Description Quantity Unit Location
1 1000 Shores, erect and strip, by hand, vertical members to 10' high ea
2 0500 Shores, erect and strip, by hand, horiz mbrs, alum jsts and stringers ea
3 5080 Window demolition, remove and reset window, maximum ea
4 0200 Door demo, doors, exterior, 1-3/4" thick, single, 3' x 7' high ea
5 2000 Door demo, frames, including trim, metal ea
6 6600 Framing demo, wood framing, studs, 2" x 4" lf
7 6640 Framing demo, wood framing, studs, 2" x 6" lf
8 3800 Framing demo, wood framing, headers over openings, 2 @ 2" x 6" lf
9 3840 Framing demo, wood framing, headers over openings, 2 @ 2" x 8" lf
10 3880 Framing demo, wood framing, headers over openings, 2 @ 2" x 10" lf
11 3090 Millwork & trim demo, trim, basebd, remove and reset, maximum lf
12 5200 Roofing & siding demo, siding, wood, boards, vertical 240.000 sf
13 5240 Roofing & siding demo, siding, wood, shingles 240.000 sf
7
Notes
Attachment
OK
Cancel
Help
Quantity: 240.00 sf
Cost: $64,171.18
$267.38 / sf

Figure 60: Replacing Pass

Two passes will be created, Pass 2 and Pass 3.

Pass 2: Reversing Pass (original pass number). This pass will cancel the dimensions and values of the original pass by assigning a negative number to the quantity. In this case, the Quantity will be -1.

Pass 3: Replacing Pass (original pass number). The replacing pass takes the place of the original pass in the estimate. In the example above, the new pass, which is labeled number 3, replaces the original pass, which is labeled number 1.

7. Click **OK** to change the estimate.

> **CAUTION** If the above steps are not followed, the new pass values will be added to the original estimate total. As a result, the estimate cost will include both totals.

Revising Data on the Spreadsheet

After completing the takeoff process (using Assembly, Item or Quick Takeoff), the items selected appear on the estimate spreadsheet.

Users may modify the spreadsheet by using the "Right Click" feature of the mouse. The menus that appear by right clicking vary based on where and what window is open. This is the fastest way to perform functions such as Cut, Copy, Paste, Delete Row, and (view) Notes.

Modifying descriptions - Users can modify the item description to better describe the corrective action by typing in a new value in the Description column. It is important to note that this new description will be transferred to the work order operational steps in FMSS each and every time the description in CESS is changed and the estimate is transferred.

Modifying quantities - Users can modify the quantity of each item by typing in a new value in the Takeoff Quantity column. The system will calculate the related amounts (Labor, Materials, Equipment, etc.) and update the estimate totals.

Deleting items - If a user wants to remove an item from the spreadsheet,

a. "Right Click" on the gray row header on each item to be deleted. The row appears with a black background when you click on the gray row header.
b. Select the Delete Row menu option

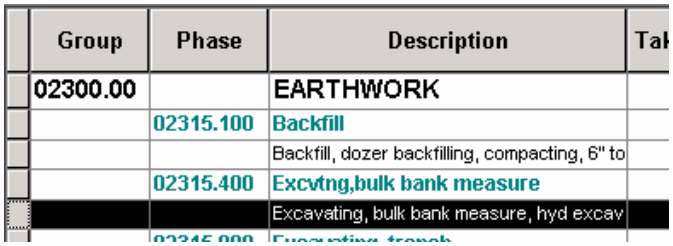


Figure 61: Deleting a Row

The line item will be removed from the spreadsheet.

NOTE: Hold the SHIFT or CTRL key while clicking to select multiple items

CAUTION Remember that modifying descriptions, quantities, or deleting items in CESS will transfer modifications to the corresponding work order in FMSS.

Duplicating Cost Estimates

In some cases, you may want to duplicate cost estimates to avoid entering the same information multiple times. For example, you might want to use this feature when a park has several "Mission 66" houses that all need new roof coverings.

1. From one of the deficiency work orders for roof replacement, go to the "Costs" tab and click on the "CESS Estimate" button to go to the spreadsheet.

2. Create the estimate as usual, and work through the process until the amount is shown on the work order and the status has been changed to “COSTED.”

3. Go to the next roof deficiency work order. Again select the “Costs” tab and click on the “CESS Estimate” button. A new, blank spreadsheet will appear.

4. Click on the “Open Estimate” icon (an opening file folder) on the icon menu bar. Find the original roofing estimate in the pop-up box (it will be identified by the asset number-work order number). Highlight the estimate then click on “Open.” The original estimate will open on top of the new spreadsheet.

5. Go to the top menu bar and click on “Window.” Highlight “Tile Vertical” and click on it. The new, blank spreadsheet will appear alongside the original estimate.

6. Take the cursor to the first left-hand square of the original estimate. (This should be right next to the “Group” number.) Holding the left mouse button down, drag the cursor down the estimate to the bottom-left square of the estimate. This should highlight the whole spreadsheet.

7: Still holding the left mouse button down, drag the cursor over to the new spreadsheet and release it. An identical spreadsheet will appear on the new estimate.

8. Close the original spreadsheet and maximize the new spreadsheet. Complete the estimate as usual. Any adjustments can be made on the spreadsheet, such as deleting an item (line) that is not needed, adding an additional item, or adjusting a quantity amount.

Deleting an Estimate

Deleting an estimate is a complicated process that requires the user to exit the CESS program before deleting an estimate. Please contact the FMP Helpdesk to perform this function.

Templates

Some parks will have the same type of recurring deficiencies that may not be addressed by an assembly. In this case, the answer is to set up a template estimate file that contains the items you will use for a particular situation.

After the system creates an estimate file from a deficiency work order, you can open an existing template and copy items from the template directly into the new estimate spreadsheet. This process may be a more efficient way to use CESS.

Creating a Template

While CESS is open, users can create a template estimate as follows:

1. Click on: to create a New Estimate. The following window opens.

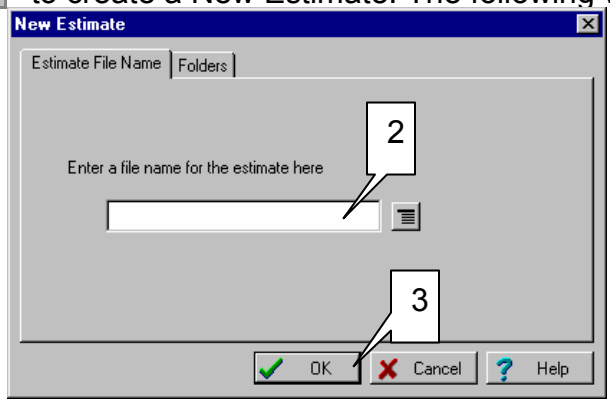


Figure 62: New Estimate Window

2. Enter the template file name, such as **Roofing template**.

3. Click **OK** to continue to the “Estimate Information” window.

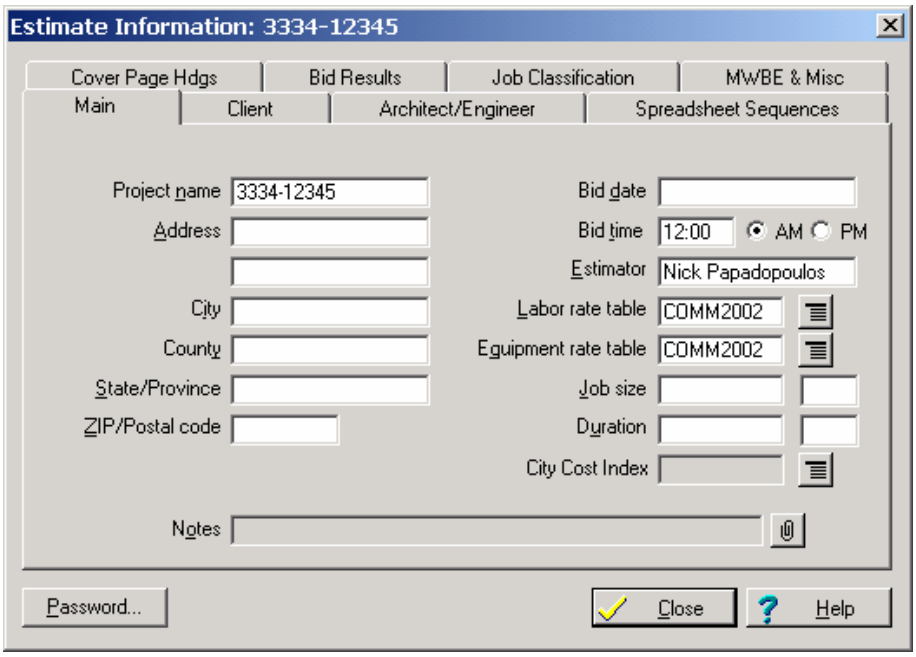


Figure 63: Estimate Information Window

4. Enter **the user's first and last name** in the "Estimator" field, and then click **OK**.

5. Perform takeoff using Assembly, Item, or Quick Takeoff and copy the desired items from the database into the template.

The template is now complete and ready for use.

CAUTION You may not use a template that was created against the npsdual cost database for duplication to an npsdual04 estimate.

Using a Template

1. Perform the initial steps of the CESS process so that the system will create and open a work order estimate.
2. Click on: to open an estimate. The following window opens.

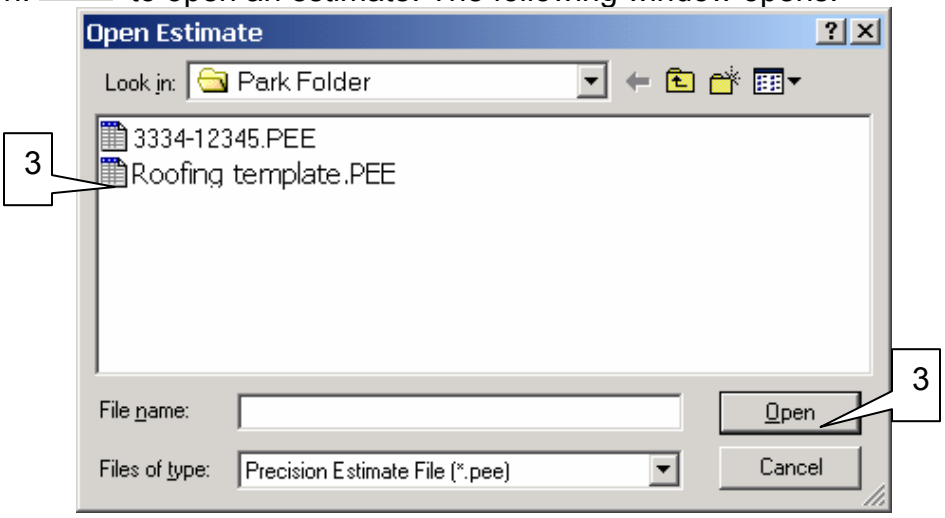


Figure 64: Open Estimate Window

3. Select the template and click the **Open** button.
4. Open new estimate.

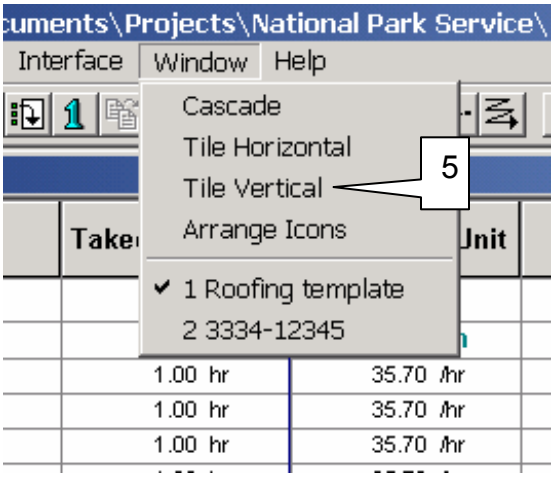


Figure 65: Tile Vertical Menu Option

5. Click on the **Window – Tile Vertical** menu option. The template and new work order estimate will appear side by side.

NOTE: The template and work order estimate may be reversed.

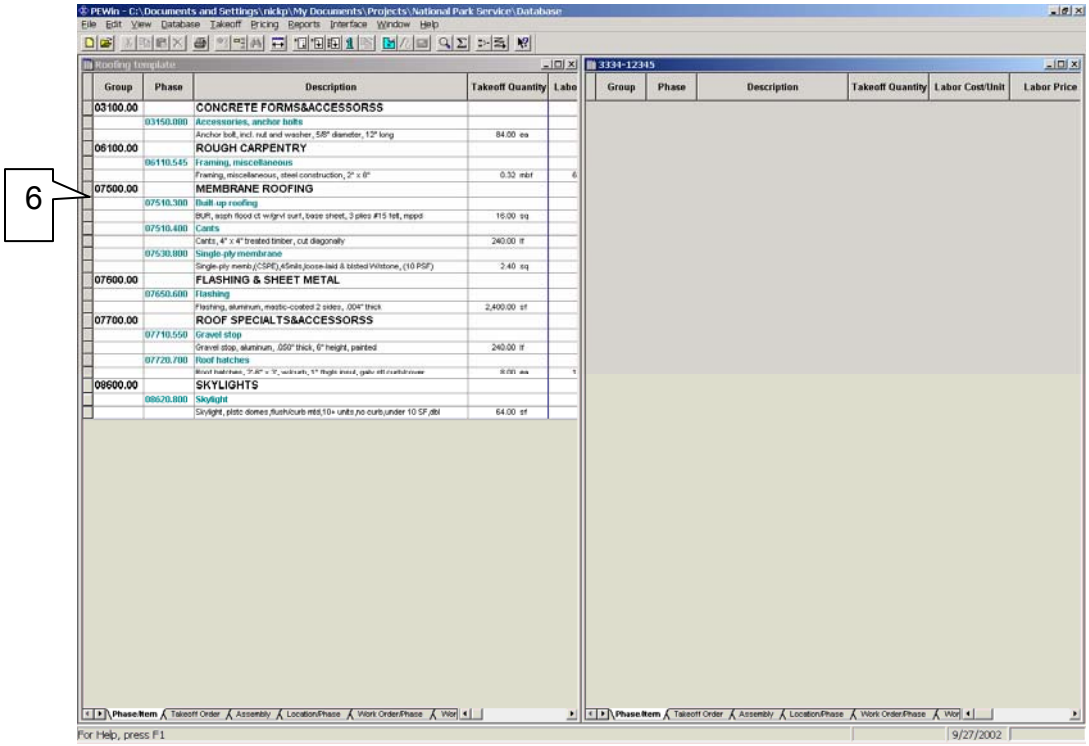


Figure 66: Template and Work Order Estimate

6. Select one or more items from the template estimate by clicking the gray cell in the leftmost column and holding the button down.

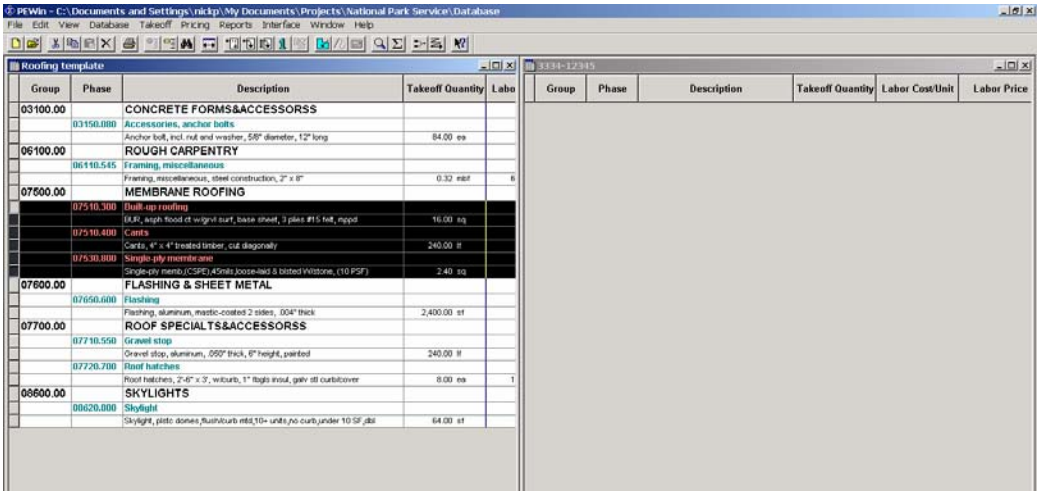


Figure 67: Template Estimate

NOTE: Users must select the gray box on the item(s) you want to copy. The row appears with a black background when you click on the gray box. Users can select multiple items by holding down the SHIFT or CTRL keys.

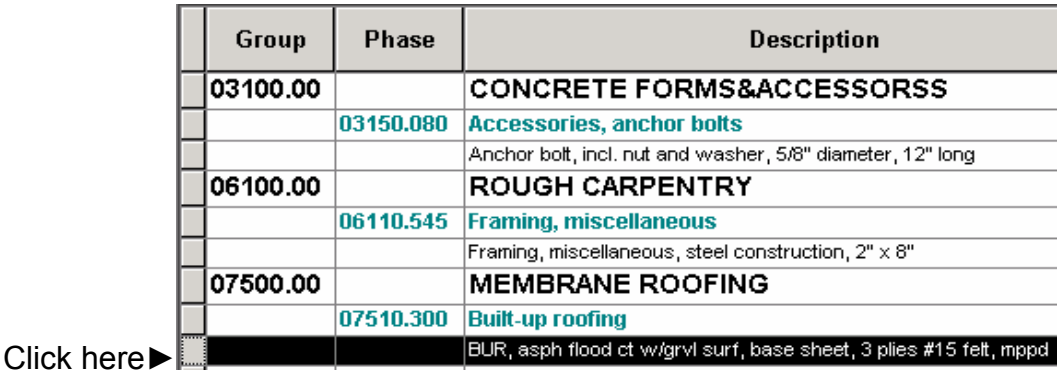


Figure 68: Copying Items

7. Drag the selected items to the deficiency work order estimate. The items from the template will appear in the deficiency work order estimate.

8. You are now finished with the template. Close the template by clicking on the X.

9. Modify the item Takeoff quantities in the deficiency work order estimate.

Price Factor

Confirming the Price Factor

In order to confirm that a price factor has been applied to an estimate, one must view the estimate in the spreadsheet layout view.

Figure 69: Spreadsheet Layout

1. Open or create an estimate.

2. Select the spreadsheet layout icon on the tool bar. The spreadsheet layouts window will open.

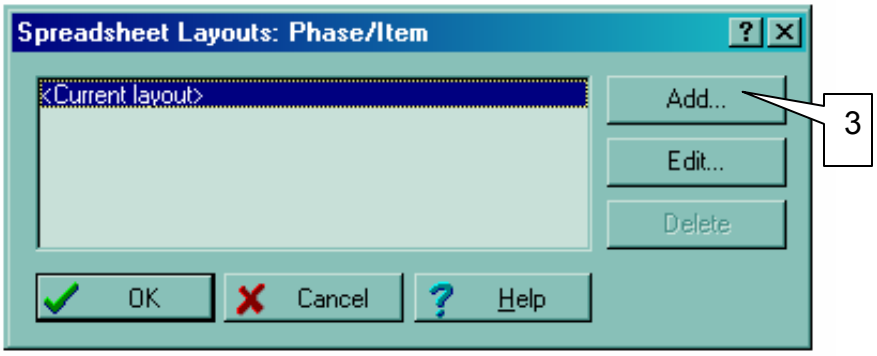


Figure 70: Adding a new Spreadsheet Layout

3. Click on the **Add** button.

I have text from the class for Confirming the price factor: Need to check
1. Go to takeoff in the menu bar
2. Click on estimate information
3. Click on icon to the right of City Cost Index
4. Click on your park alpha code
5. A window will appear that will reprice the entire estimate with the selected cost index
6. Click “OK”

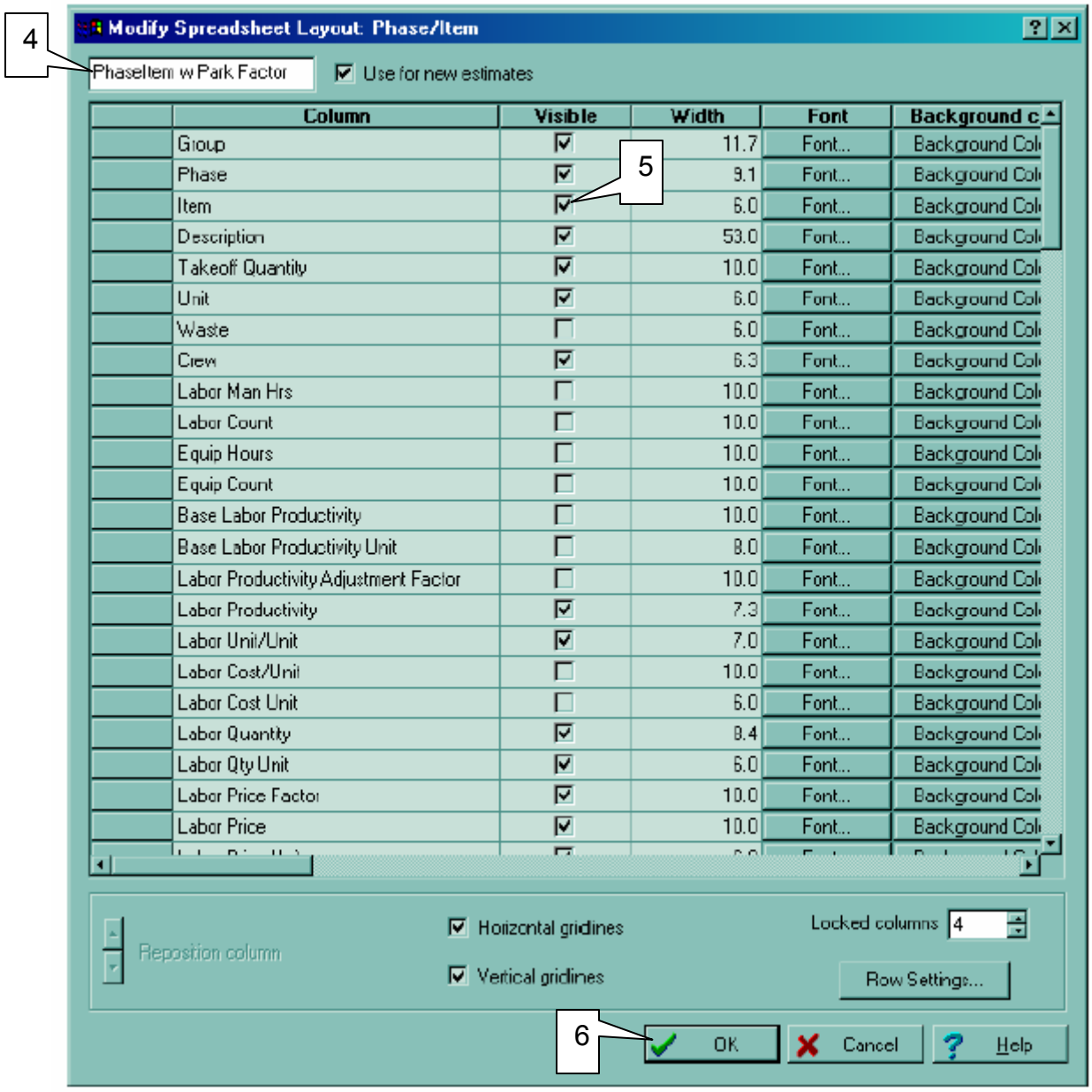


Figure 71: Modified Spreadsheet Layout

4. Name the layout.

5. The columns that were in your original view of the estimate will be checked. Add or delete the checks that you require. At a minimum, check the Labor, Equipment or Materials Price Factor. This will add a column to your view that will identify the Price Factor.

6. Click **OK**. You will be returned to the spreadsheet layout.

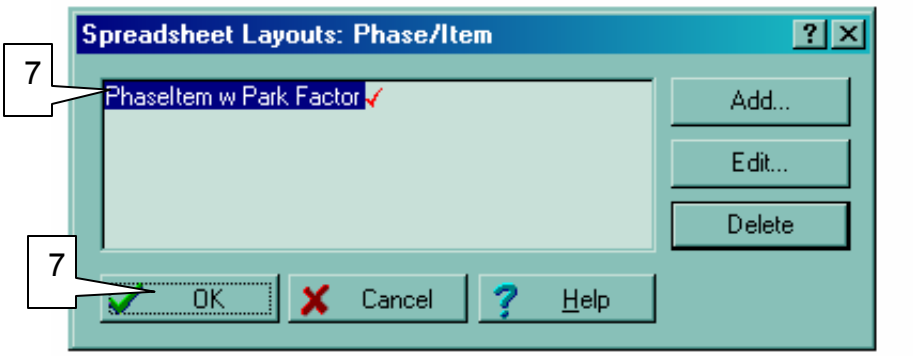
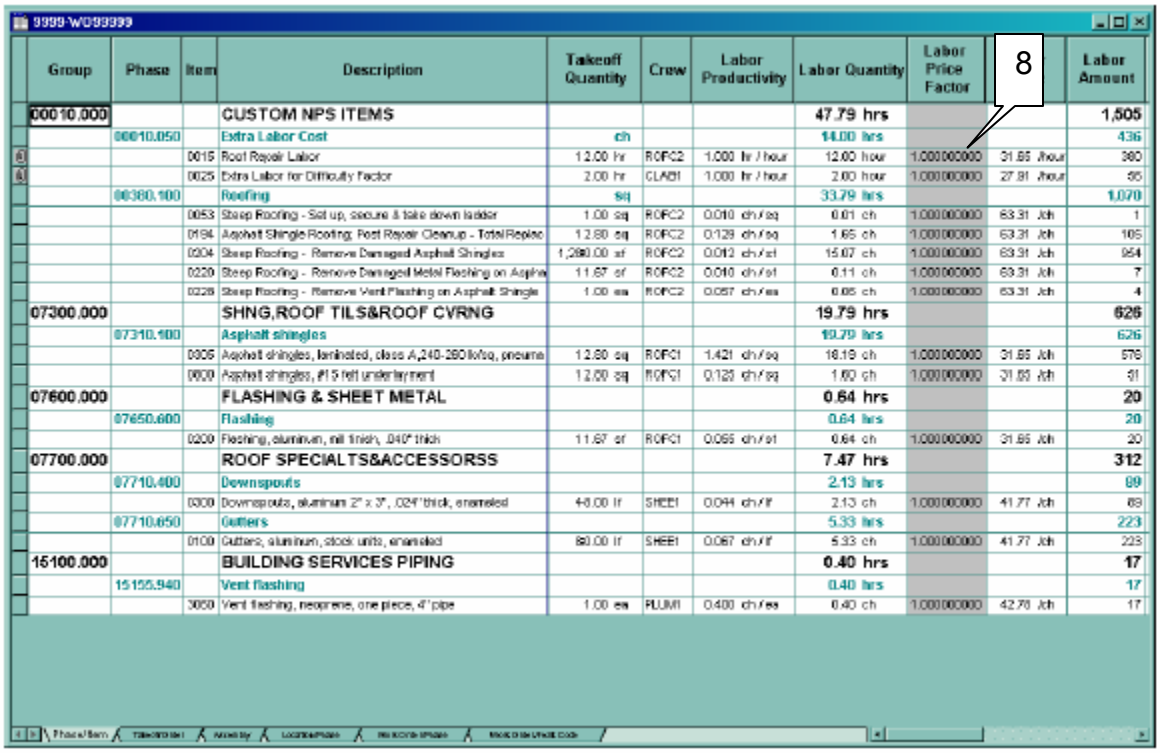


Figure 72: Naming Spreadsheet View

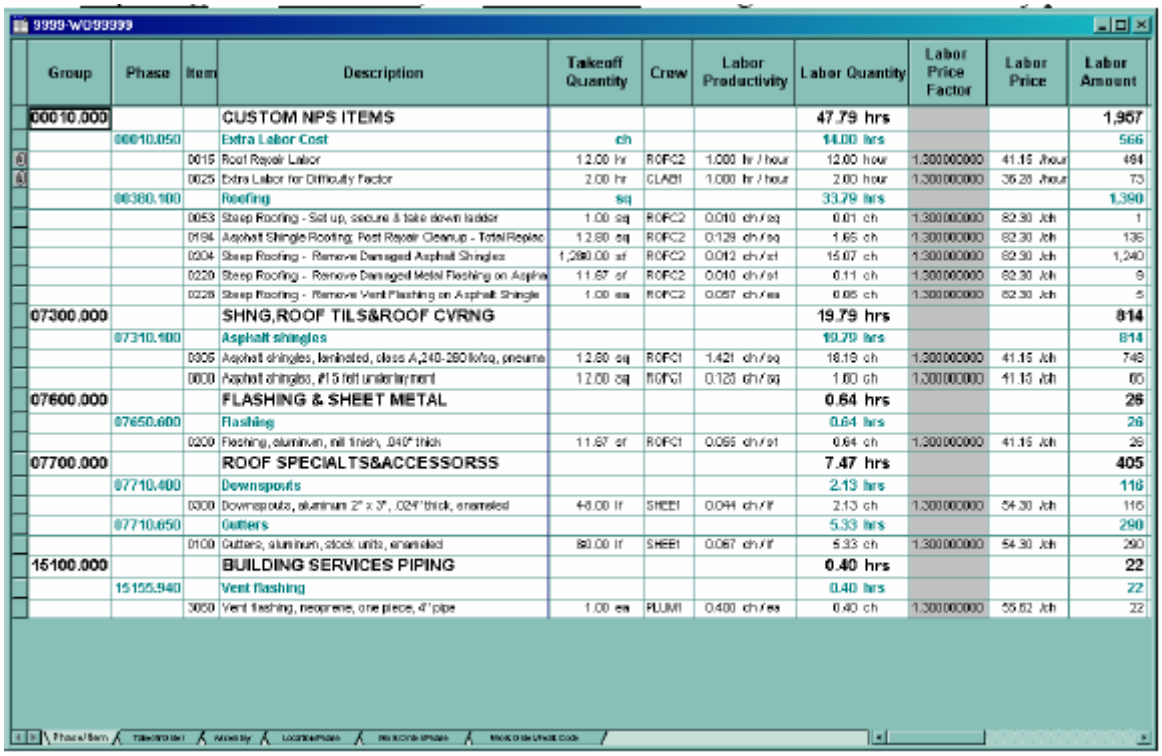
7. Highlight your **new name** and select **OK**. The spreadsheet with the new column(s) will be displayed.



Group	Phase	Item	Description	Takeoff Quantity	Crew	Labor Productivity	Labor Quantity	Labor Price Factor		Labor Amount
00010.000			CUSTOM NPS ITEMS				47.79 hrs			1,505
	00010.050		Extra Labor Cost	ch			14.00 hrs			436
		0015	Roof Repair Labor	12.00 hr	ROFC2	1.000 hr / hour	12.00 hour	1.000000000	31.85 /hour	380
		0025	Extra Labor for Difficulty Factor	2.00 hr	CLAB1	1.000 hr / hour	2.00 hour	1.000000000	27.91 /hour	55
	00380.100		Roofing	sq			33.79 hrs			1,070
		0053	Steep Roofing - Set up, secure & take down ladder	1.00 sq	ROFC2	0.010 ch / sq	0.01 ch	1.000000000	63.31 /ch	1
		0194	Asphalt Shingle Roofing: Roof Repair Clean-up - Total Replac	12.80 sq	ROFC2	0.129 ch / sq	1.65 ch	1.000000000	63.31 /ch	105
		0204	Steep Roofing - Remove Damaged Asphalt Shingles	1,280.00 sf	ROFC2	0.012 ch / sf	15.07 ch	1.000000000	63.31 /ch	954
		0220	Steep Roofing - Remove Damaged Metal Flashing on Asphal	11.67 sf	ROFC2	0.010 ch / sf	0.11 ch	1.000000000	63.31 /ch	7
		0228	Steep Roofing - Remove Vent Flashing on Asphalt Shingle	1.00 ea	ROFC2	0.057 ch / ea	0.05 ch	1.000000000	63.31 /ch	4
07300.000			SHNG,ROOF TILS&ROOF CVRNG				19.79 hrs			626
	07310.100		Asphalt shingles				19.79 hrs			626
		0005	Asphalt shingles, laminated, class A,240-260 lb/sq, pneuma	12.80 sq	ROFC1	1.421 ch / sq	18.19 ch	1.000000000	31.85 /ch	576
		0020	Asphalt shingles, #15 felt underlayment	12.00 sq	ROFC1	0.123 ch / sq	1.60 ch	1.000000000	31.85 /ch	51
07600.000			FLASHING & SHEET METAL				0.64 hrs			20
	07650.600		Flashing				0.64 hrs			20
		0200	Flashing, aluminum, mill finish, .040" thick	11.67 sf	ROFC1	0.055 ch / sf	0.64 ch	1.000000000	31.85 /ch	20
07700.000			ROOF SPECIALTS&ACCESSORSS				7.47 hrs			312
	07710.400		Downspouts				2.13 hrs			89
		0300	Downspouts, aluminum 2" x 3", .024" thick, enameled	48.00 lf	SHEE1	0.044 ch / lf	2.13 ch	1.000000000	41.77 /ch	89
	07710.650		Gutters				5.33 hrs			223
		0100	Gutters, aluminum, stock units, enameled	80.00 lf	SHEE1	0.067 ch / lf	5.33 ch	1.000000000	41.77 /ch	223
15100.000			BUILDING SERVICES PIPING				0.40 hrs			17
	15155.940		Vent flashing				0.40 hrs			17
		3050	Vent flashing, neoprene, one piece, 4" pipe	1.00 ea	PLUM1	0.400 ch / ea	0.40 ch	1.000000000	42.76 /ch	17

Figure 73: Labor Price Factor

8. If the **Labor Price Factor** column has 1.000000000, your location factor has not been identified. Return to page 118 in the manual to learn how to reprice an estimate. After repricing, the factor will be adjusted to the CCI park factor.



9999-WO99999

Group	Phase	Item	Description	Takeoff Quantity	Crew	Labor Productivity	Labor Quantity	Labor Price Factor	Labor Price	Labor Amount
00010.000			CUSTOM NPS ITEMS				47.79 hrs			1,957
	00010.050		Extra Labor Cost	ch			14.00 hrs			566
		0015	Roof Repair Labor	12.00 hr	ROFC2	1.000 hr / hour	12.00 hour	1.300000000	41.15 /hour	494
		0025	Extra Labor for Difficulty Factor	2.00 hr	CLAB1	1.000 hr / hour	2.00 hour	1.300000000	35.28 /hour	73
	00380.100		Roofing	sq			33.79 hrs			1,390
		0053	Steep Roofing - Set up, secure & take down ladder	1.00 sq	ROFC2	0.010 ch / sq	0.01 ch	1.300000000	82.30 /ch	1
		0194	Asphalt Shingle Roofing: Post Repair Cleanup - Total Replac	12.80 sq	ROFC2	0.129 ch / sq	1.65 ch	1.300000000	82.30 /ch	136
		0204	Steep Roofing - Remove Damaged Asphalt Shingles	1,280.00 sf	ROFC2	0.012 ch / sf	15.07 ch	1.300000000	82.30 /ch	1,240
		0220	Steep Roofing - Remove Damaged Metal Flashing on Asphal	11.67 sf	ROFC2	0.010 ch / sf	0.11 ch	1.300000000	82.30 /ch	9
		0228	Steep Roofing - Remove Vent Flashing on Asphalt Shingle	1.00 ea	ROFC2	0.057 ch / ea	0.05 ch	1.300000000	82.30 /ch	5
07300.000			SHNG,ROOF TILS&ROOF CVRNG				19.79 hrs			814
	07310.100		Asphalt shingles				19.79 hrs			814
		0305	Asphalt shingles, laminated, class A,240-260 lb/sq, prewra	12.80 sq	ROFC1	1.421 ch / sq	18.19 ch	1.300000000	41.15 /ch	748
		0600	Asphalt shingles, #15 felt underlayment	12.00 sq	ROFC1	0.120 ch / sq	1.60 ch	1.300000000	41.15 /ch	66
07600.000			FLASHING & SHEET METAL				0.64 hrs			26
	07650.600		Flashing				0.64 hrs			26
		0200	Flashing, aluminum, mill finish, .040" thick	11.67 sf	ROFC1	0.055 ch / sf	0.64 ch	1.300000000	41.15 /ch	26
07700.000			ROOF SPECIALTS&ACCESSORSS				7.47 hrs			405
	07710.400		Downspouts				2.13 hrs			116
		0300	Downspouts, aluminum 2" x 3", .024" thick, enameled	40.00 lf	SHEE1	0.044 ch / lf	2.13 ch	1.300000000	54.30 /ch	116
	07710.650		Gutters				5.33 hrs			290
		0100	Gutters, aluminum, stock units, enameled	80.00 lf	SHEE1	0.067 ch / lf	5.33 ch	1.300000000	54.30 /ch	290
15100.000			BUILDING SERVICES PIPING				0.40 hrs			22
	15155.940		Vent flashing				0.40 hrs			22
		3000	Vent flashing, neoprene, one piece, 4" pipe	1.00 ea	PLUM1	0.400 ch / ea	0.40 ch	1.300000000	55.62 /ch	22

Figure 74: Updated Labor Price Factor

NOTE: If there is more than one person using CESS at your park, then you are sharing the spreadsheet layouts. The layouts are saved for each park, not each user. You will need to coordinate with the other users at your park for naming and changing spreadsheet layouts.

Entering Contractor Estimates

Pricing for some work is obtained by soliciting subcontractor quotes or from previous work done by contractors. Since the quote will already include the local price adjustment and markups, it must be entered into CESS via the following procedure.

1. Open and complete the estimate, except for the contracted amount.
2. The quote from the (sub)contractor must be reduced by the amount of the mark ups on the Totals window for the estimate. These are fixed values and they are multiplied together. The total mark up is 1.2 x 1.08 x 1.2 = 1.5553. For a sample quote of $100,000, you need to divide the amount by 1.5553: 100,000/1.5553 = 64,296.28

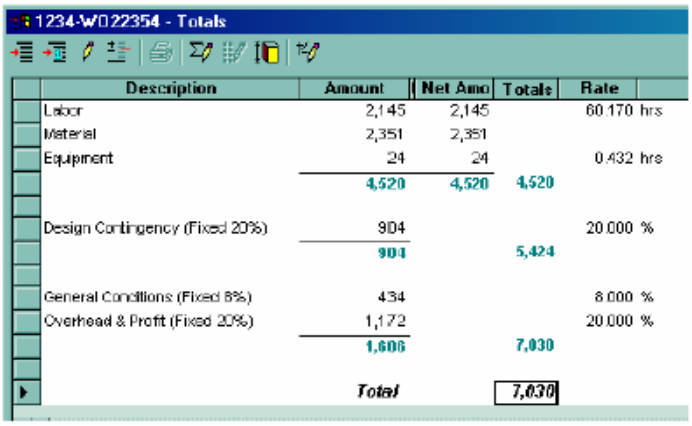


Figure 75: Totals Window

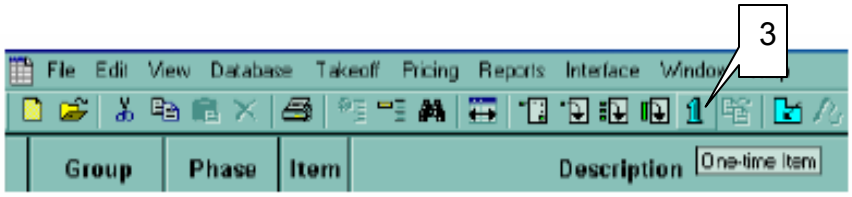


Figure 76: Subcontractor Quote

3. Create a one-time item for the contractor or subcontractor by clicking on the **1** icon on the tool bar.

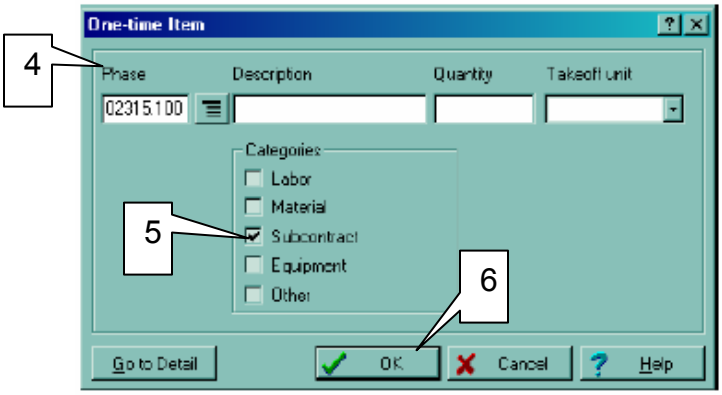
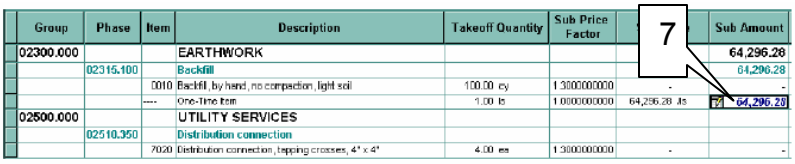


Figure 77: One-time Item

4. Enter the Phase from the drop-down button, the description, and a quantity of 1 and a unit of “ls” (lump sum).

5. Click on the check box for **Subcontract** and uncheck the other boxes.

6. Click **OK**.

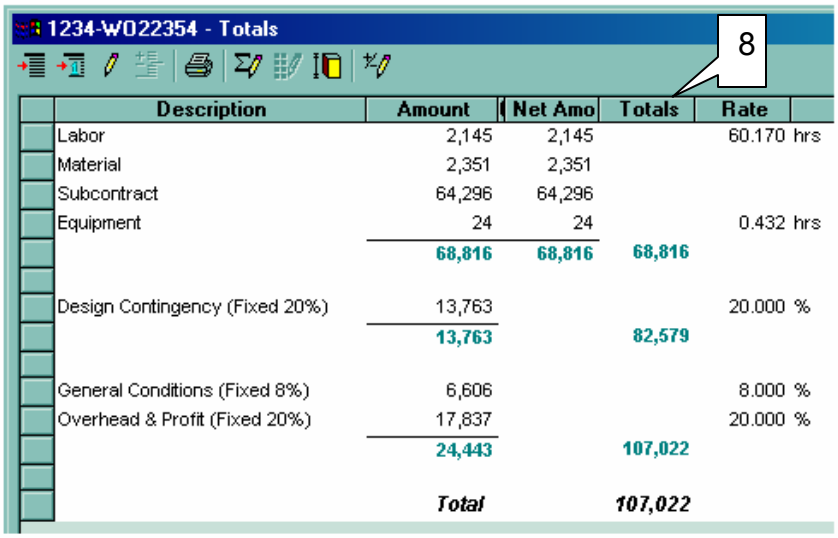


Group	Phase	Item	Description	Takeoff Quantity	Sub Price Factor		Sub Amount
02300.000			EARTHWORK				64,296.28
	02315.100		Backfill				64,296.28
		0010	Backfill, by hand, no compaction, light soil	100.00 cy	1.3000000000	-	-
		----	One-Time Item	1.00 ls	1.0000000000	64,296.28 /ls	64,296.28
02500.000			UTILITY SERVICES				
	02510.350		Distribution connection				
		7020	Distribution connection, tapping crosses, 4" x 4"	4.00 ea	1.3000000000	-	-

Figure 78: Sub Amount column

7. Enter the adjusted amount in the Sub Amount column of the spreadsheet.

NOTE: The font for the adjusted amount changes to a special font because it was entered in the sub amount column.



Description	Amount	Net Amo	Totals	Rate
Labor	2,145	2,145		60.170 hrs
Material	2,351	2,351		
Subcontract	64,296	64,296		
Equipment	24	24		0.432 hrs
	68,816	**68,816**	**68,816**	
Design Contingency (Fixed 20%)	13,763			20.000 %
	13,763		**82,579**	
General Conditions (Fixed 8%)	6,606			8.000 %
Overhead & Profit (Fixed 20%)	17,837			20.000 %
	24,443		**107,022**	
	Total		***107,022***	

Figure 79: New Totals Window

8. Review the totals page and note the new total with the quote is approximately $100,000 greater than in figure #78.

> **CAUTION** Do not enter the amount in the Sub Price column. If you do, and if the estimate is repriced, then the value may be adjusted by the Park factor.

NOTE: Adding a one-time item, will cause a validation warning. If this is the only error or warning you receive, you may continue by selecting the transfer estimate button on the Warning Window (see Figure 54 on p. 122).

Printing a Report

Users can print a report for a hardcopy of the estimate. CESS includes a number of reports, with many options.

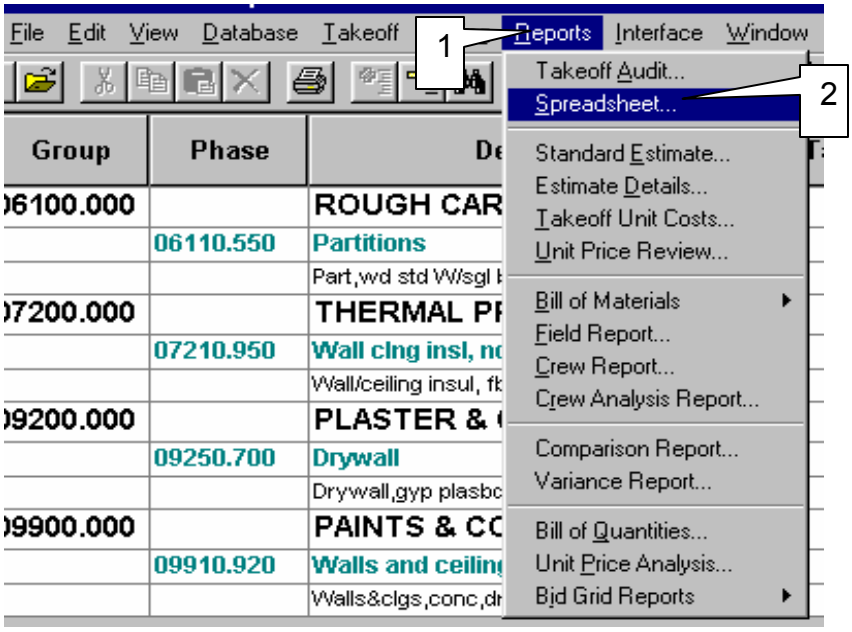


Figure 80: Selecting "Spreadsheet"

1. Go to the **Reports** drop-down menu.

2. Select **Spreadsheet.** The following window appears:

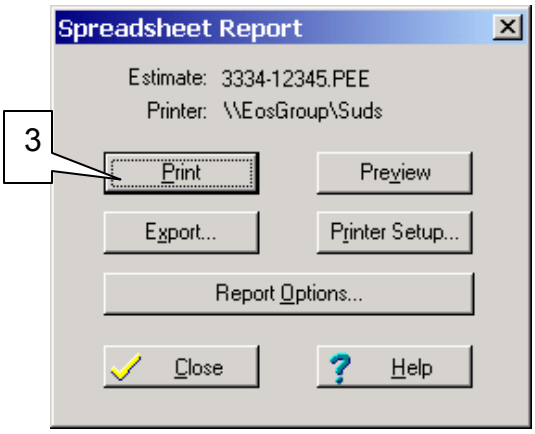


Figure 81: Print Spreadsheet Report Message Box

3. Select **Print**.

CAUTION When generating reports from CESS, DO NOT change the report options. If the report options are changed, it results in a global change to all users Servicewide. Any changes will affect the creation of the TSV file format.

NOTE: Make sure that the Printer selected is the correct printer. Otherwise, change the destination printer by clicking the Printer Setup button.

Chapter Five—Review of Key Points

- _____
- _____
- _____
- _____
- _____

Chapter Six

FCAS Work Flow

Introduction
Facility Condition Assessment Survey Work Flow
Facility Condition Assessment Survey – The Next Step

INTRODUCTION

Chapter Purpose

This chapter will provide a hands-on review of the FCAS work flow between FMSS and CESS as well as a more thorough review of the Facility Condition Assessment Survey. The Facility Condition Assessment Survey work flow establishes a systematic and effective method for data input, inspection, cost estimating, and FMSS updating to reflect the condition of the facility systems (“built” resources) within the National Park Service.

Chapter Objectives

After completing this chapter, participants should be able to:

- Explain the role of each of the steps of the Facility Condition Assessment Survey work flow.
- Understand the role that the FMSS plays in the Facility Condition Assessment Survey and CESS.
- Demonstrate the ability to navigate through the basic components of the FMSS and CESS.
- Understand and complete Condition Assessment Work Orders and follow-up Deficiency Work Orders in the FMSS, including using appropriate criteria.
- Explain the process and mechanics of completing a Facility Condition Assessment Survey using the Facility Condition Assessment Survey work flow in the FMSS and CESS.
- Define a Condition Assessment Job Plan and determine how to employ it in the field to create consistent inspection procedures throughout the NPS.
- Create the necessary data records to implement the Facility Condition Assessment Survey work flow in the FMSS and the CESS.

FACILITY CONDITION ASSESSMENT SURVEY WORK FLOW

The required steps to complete the Facility Condition Assessment Survey process are based on the use of CESS as well as some modules or applications in FMSS. The ability to complete a Facility Condition Assessment Survey and document the results for a park unit or Servicewide reporting of deferred maintenance costs is essential for stewardship and accountability, as defined by the Department of Interior and Congress.

The Facility Condition Assessment Survey work flow is an integrated process between FMSS and CESS, and it includes various modules and/or applications in the FMSS.

NOTE: For assets that already have a CA PM established, steps 1-4 will be unnecessary. For these assets, you can begin the process at step 5.

1. In the Asset module, locate the specific asset to be inspected, note its FMSS number, and verify the record is complete, including required fields.
2. Develop a Current Replacement Value using the Current Replacement Value calculator.
3. In the Plans module, select the appropriate CA Plan and note its CA Plan number.
4. Select the PM module, create a condition assessment PM using the asset number and CA Plan, and save the PM.
5. Generate a condition assessment work order from the PM.
6. Change the condition assessment work order status to INPRG. Run the CAWOAPR2 report to be used as a checklist during the inspection. Also run the WOCALD report to print out previously identified deficiencies, and print the appropriate inspection guidance document.

7. Conduct the condition assessment inspection and identify new deficiencies and corrective actions. Also, verify previously identified deficiencies and make adjustments in the corrective actions as appropriate. Record the inspection time actuals on the condition assessment work order.

8. If deficiencies have been identified, generate follow-up work orders. In generating work orders, consider the actions required, work type, projected year for accomplishment, and system/component to ensure good work planning.

9. Close the condition assessment work order.

10. Assure the data is complete in the follow-up work order(s) that were generated. Record the deficiencies and corrective action in the long description. Change work order status to WACOST (waiting costing)

11. The data in the deficiency work order is used to perform the CESS process. Estimate corrective actions with CESS.

12. After the cost estimate is developed in CESS, the total costs of the deferred maintenance are returned to the deficiency work order. To view the CESS costs, refresh the follow-up work order.

13. Change the Status field to COSTED. This updates the asset record.

14. When you identify the work type of DM, CRDM, RMDM or IPH, the system will use the CESS data with the established Current Replacement Value to automatically generate an FCI and ranking. The deferred cost and the FCI data support park unit management in making decisions on asset needs.

Step 1. Obtain Asset Information

NOTE: Most assets should already have a CA PM established. If this is the case skip ahead to ***Step 5*** on page 159. Generate a condition assessment work order from the PM.

1. Open the Assets module.
2. Select Location/Asset application.
3. Select the specific asset to be inspected. One way to locate the asset you want to inspect is to enter the Park Alpha and select the View List icon (globe). However, be aware that the list generated by this method can be lengthy. Users may also search by using a query or by using a query and the percentage sign (%).
4. Write down the asset's FMSS Location/Asset number.
5. Verify the following information is entered correctly: Asset Status from the API Sheet, API, measurement unit, measurement quantity, and work category. Enter the Current Replacement Value in the CRV field.
   (If the park has already entered this information into FMSS, you may skip this step.)
6. Save.
7. Close the application.

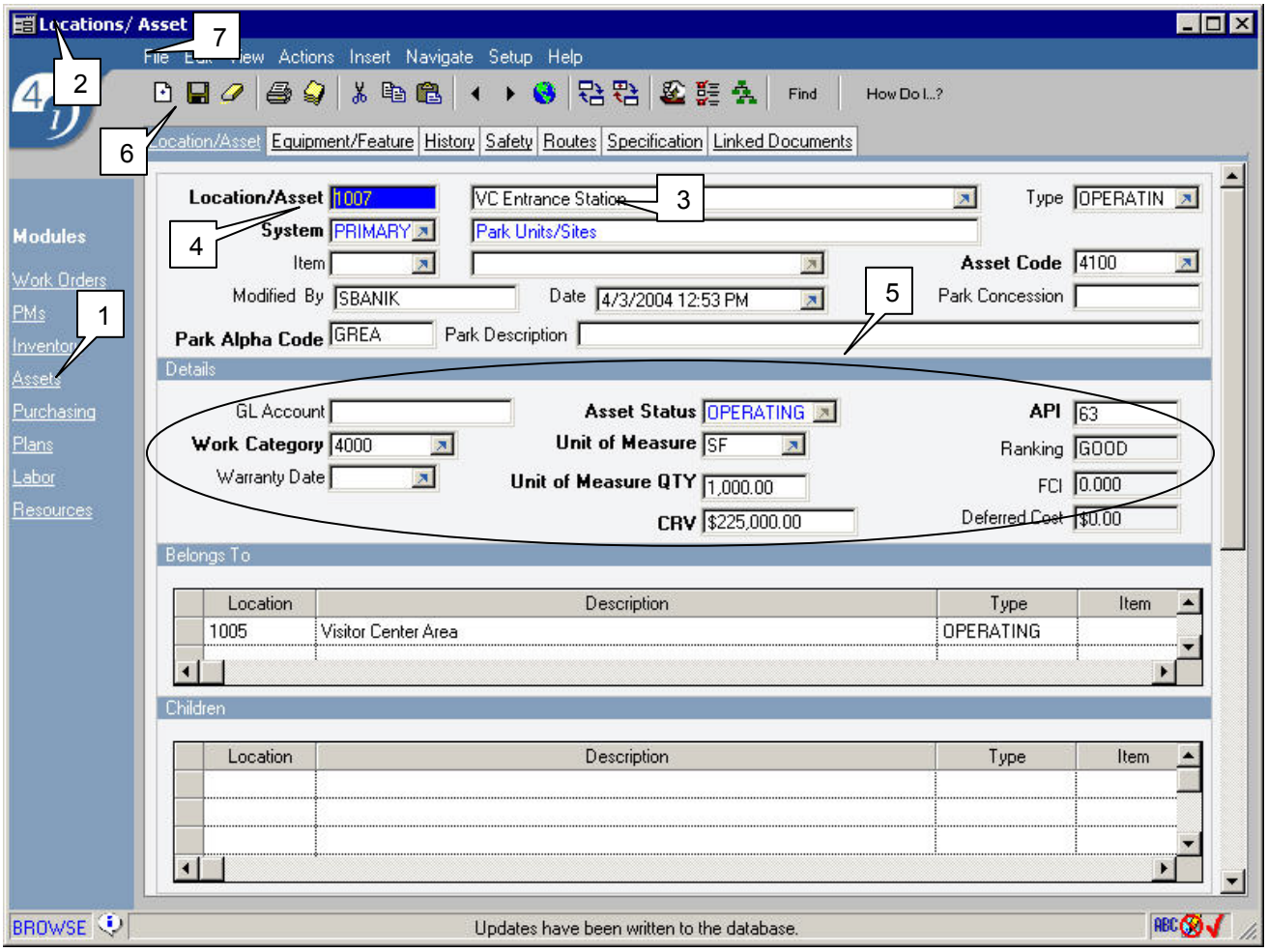


Figure 82: Obtain Asset Information

NOTE: Screenshots of FMSS indicate with numbers the selection of modules, but they cannot show the selection of applications from the drop down menu without obstructing important information on the screen shot. However, since the name of the application selection appears on the screen's title bar, the selected application can be revealed in these screen shots by pointing to its name in the title bar.

Step 2. Develop a Current Replacement Value Using the CRV Calculator

NPS units must develop a Current Replacement Value for the asset using the Current Replacement Value calculator and enter this information into the FMSS. The park may already have entered Current Replacement Value data for all assets. The value should be verified against the FY04 version of the CRV calculator. Consult Chapter Two to review how to use the Current Replacement Value calculator.

NOTE: For the purposes of this example, the Current Replacement Value calculator below has been altered.

> **CAUTION** If a Current Replacement Value has not yet been entered for the asset, users will be presented with warning messages. These messages will continue until the user populates this field.

Calculating Current Replacement Values for National Park Service Assets
Use the following worksheet to calculate the CRV for your asset.

Park:	**Independence Nat'l Historic Park**	**Park Factor:**	**1.31**
Asset #	**23456**	**Asset Description**	**Visitor Center**

Asset No.	Asset/Feature/Type Description	Quantity	Units	Unit Price	Cost
4100	**Buildings**				
	Residence (see 4300 Housing)				
	Restaurant		SF	$ 235.00	$0
	Training, Educational Facility		SF	$ 185.00	$0
	Transit Center, Bus or Train Station		SF	$ 245.00	$0
	Visitor Center/Visitor Contact Station/Museum				
	Small (less than 7200 sf)		SF	$ 298.00	$0
	Medium (7201 - 9500 sf)	8500	SF	$ 351.00	$2,983,500
	Large (more than 9501 sf)		SF	$ 245.00	$0
	Building Landscape and Site				
	Calculated as a percentage of building costs (15%)	1	Lump Sum	Formula	$447,525.00
	OR				
	Calculated as a Maintained Landscape	Calculate Costs in Section 3100 - Maintained Landscape			
	Total Area of Building =	**8,500**	**Square Feet**		
	Current Replacement Value (Includes Park Factor)				$4,486,923

Figure 83: Example of Current Replacement Value Calculator

Step 3. Obtain CA Plan Information

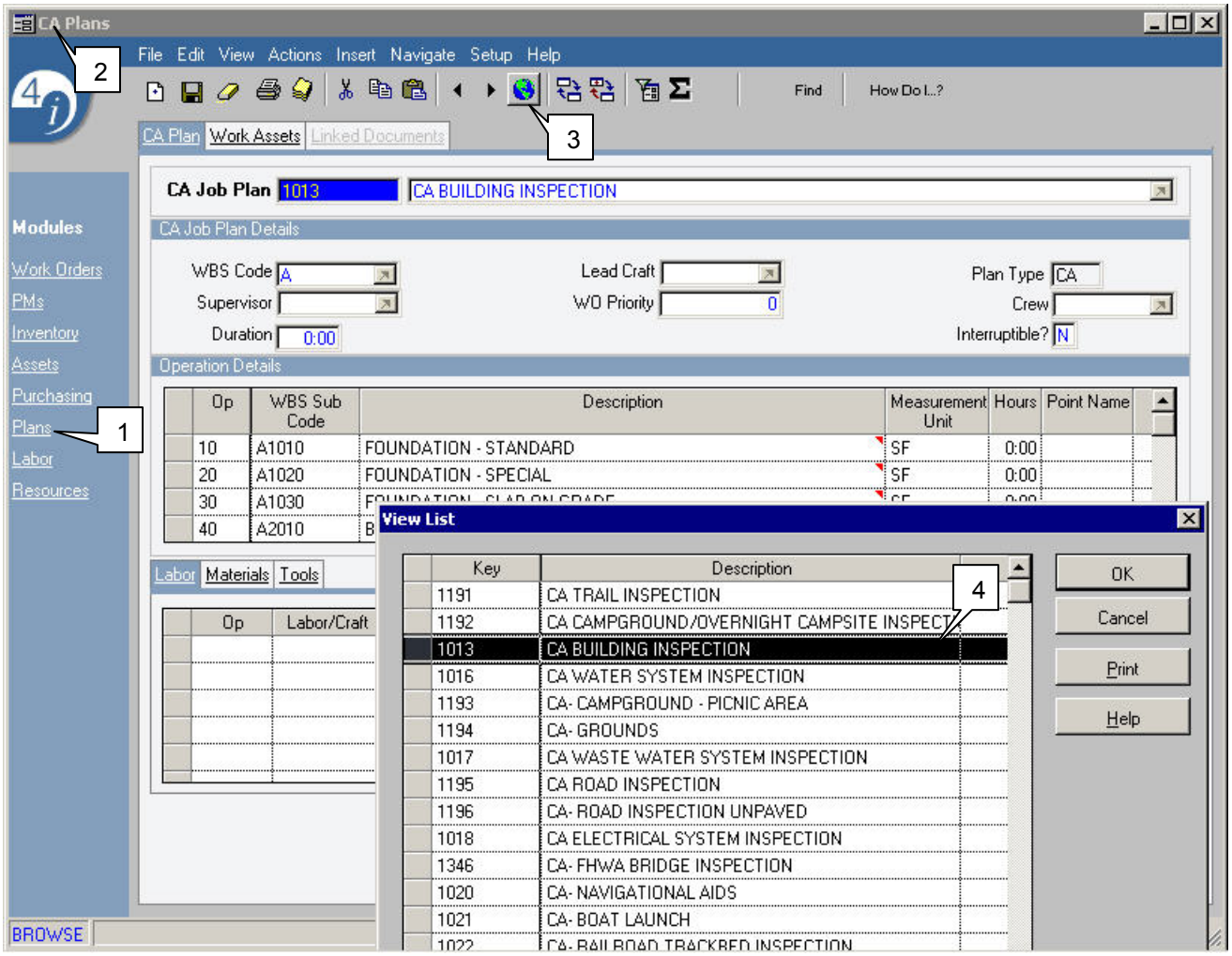


Figure 84: Obtain CA Plan Information

FMSS

1. Open the Plans module.
2. Select the CA Plans application.
3. View list using the globe icon.
4. From View List, identify a CA Plan number appropriate for the asset. If users want to verify the job plan is correct, you may hit enter to view the steps in this job plan.
5. Write down the CA Plan number.
6. Close the application.

Step 4. Create and Save a Condition Assessment PM

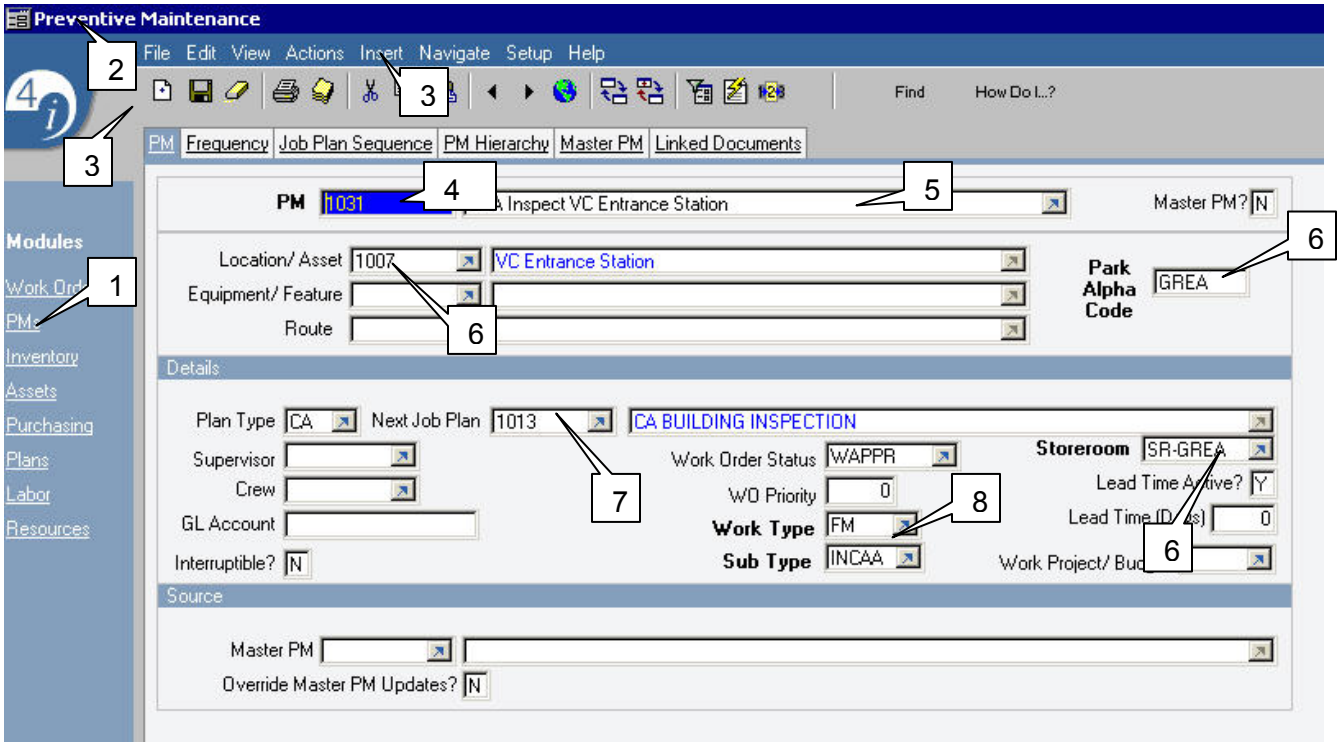


Figure 85: Create and Save a PM

FMSS

1. Open the PMs (Preventive Maintenance) module.
2. Select the Preventive Maintenance application.
   *If the PM record already exists, open it and skip the remaining steps in this section.
3. Insert a new PM with AutoNumber using Insert from the menu bar or the Insert Record With AutoNumber icon.
4. Write down this number.
5. Fill out description (name) field; for example, “Inspect VC Entrance Station.”
6. Enter the Location/Asset number written down from the first step, enter the Park Alpha code, and select the park storeroom.
7. Enter the Job Plan number written down from the previous step in the Next Job Plan field.
8. Select Work Type and Sub Type.

CAUTION FMSS will create an error dialogue if the user does not perform Step 7 before Step 8 when creating and saving a PM.

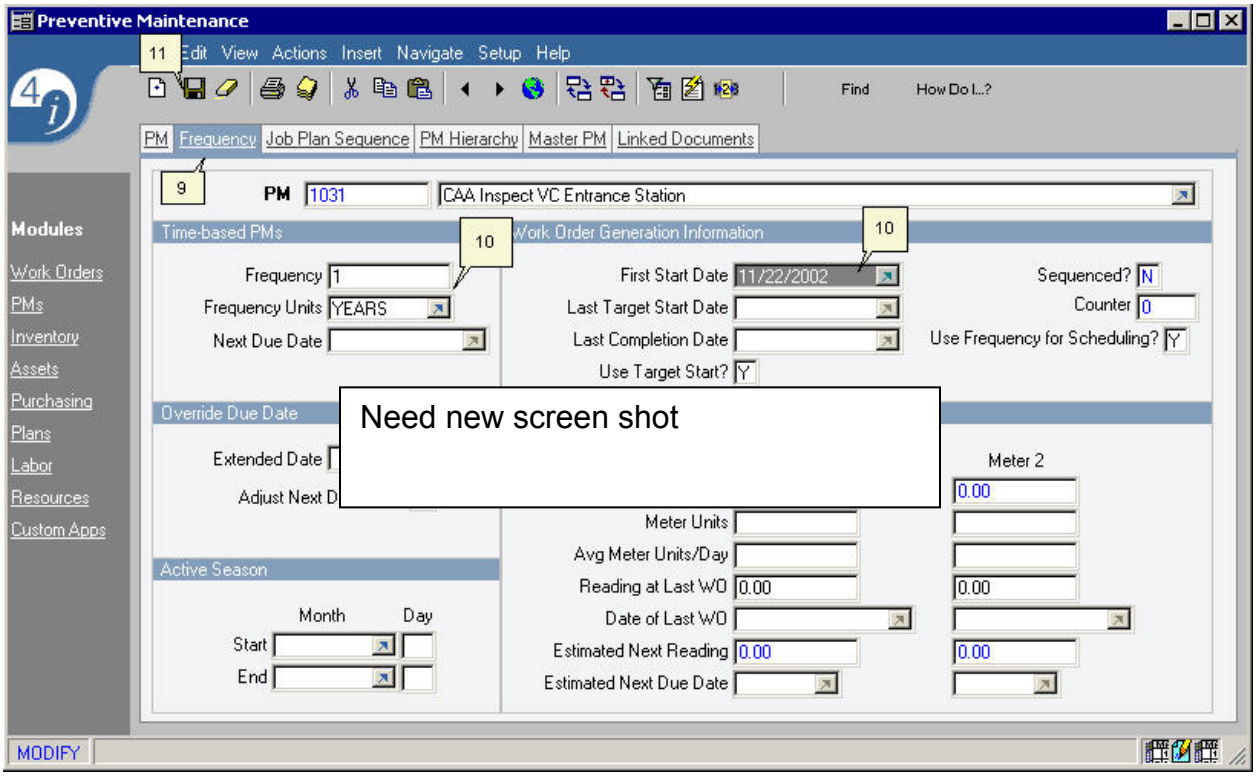


Figure 86: Create and Save a PM—Frequency Tab

9. Go to Frequency tab.
10. In the Frequency field, enter 1; in the Frequency Units field, select Years; in the First Start Date field, select Start Date.
11. Save record.

Step 5. Generate a Condition Assessment Work Order from the PM

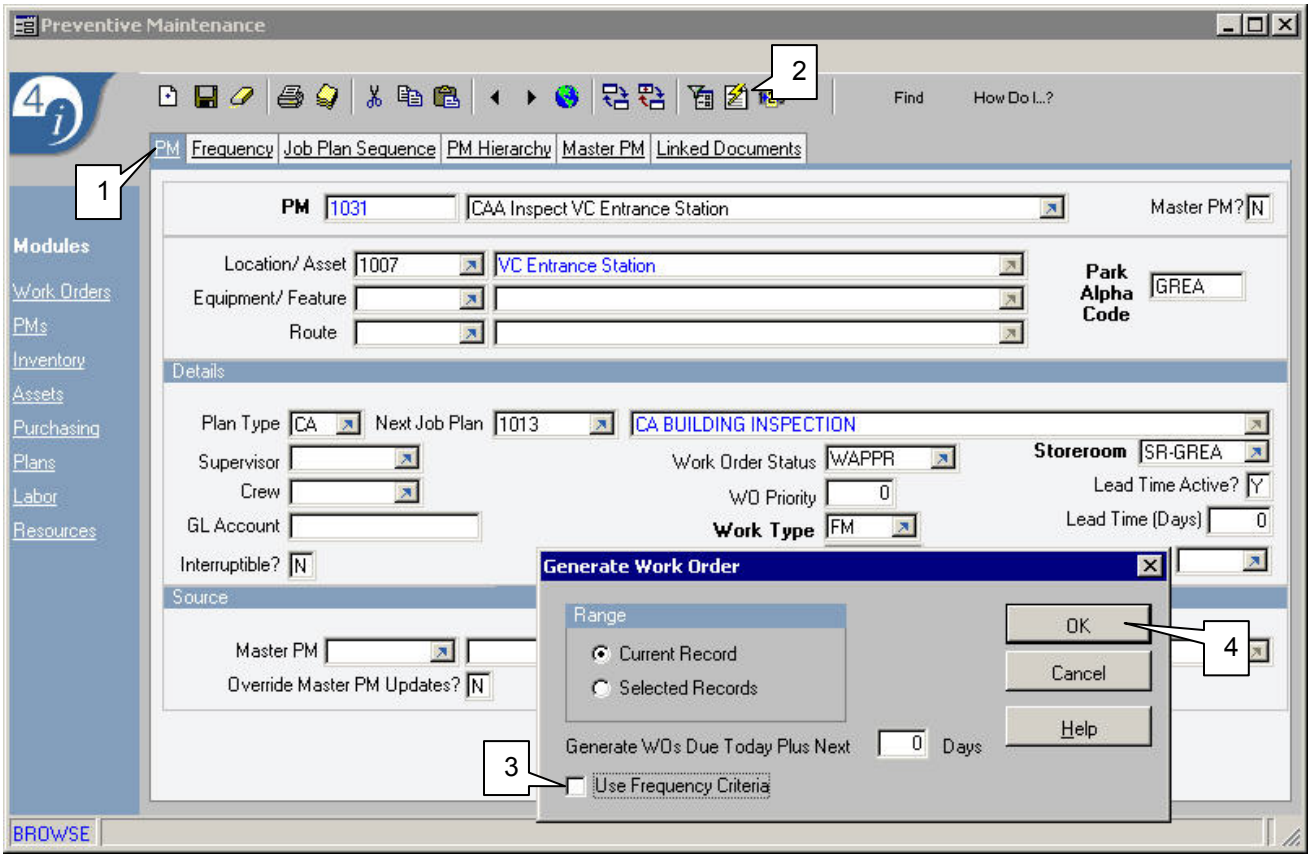


Figure 87: Generate a Condition Assessment Work Order from the PM

FMSS

1. Users may perform the following step from any of the tabs in the PM module; however, in this example the PM tab has been selected.
2. Generate a condition assessment work order by using the Generate Work Order icon (lightning bolt).
3. In the Generate Work Order box, ***uncheck the Use Frequency Criteria box so that the work order is created immediately for the purposes of this training class* only!** (If this box is left checked, the work order will be generated according to the date and scheduled in the Frequency tab.)
4. Select OK. The program will automatically generate the condition assessment work order, as indicated by the rapidly moving text that will be flashing in the status bar at the bottom of the screen.
5. Close the PM module.

Step 6. Change the Condition Assessment WO Status to INPRG and Print Documentation

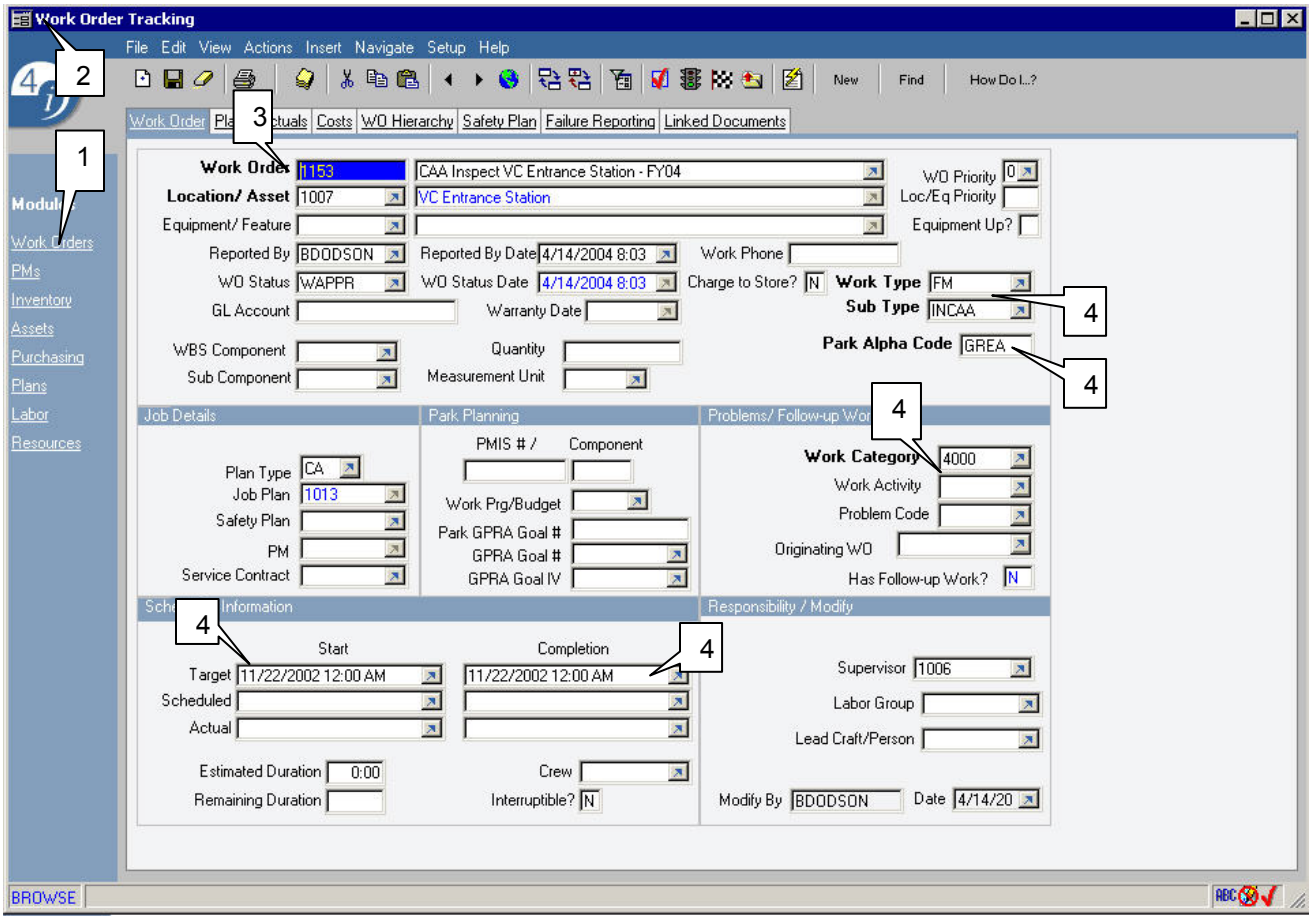


Figure 88: Initiate a Condition Assessment Work Order

FMSS

1. Go to the Work Order module.
2. Select the Work Order Tracking application.
3. Find the condition assessment work order just generated, open it, and write down the condition assessment work order number. There are several ways to locate this condition assessment work order. Some of the ways to search for this work order are:
    a. Enter the CA Plan number in the Job Plan field and select the View List icon (globe).
    b. In the PM field, enter the AutoNumber from the new PM you created and hit enter.
4. Ensure the following fields are populated: FM in the Work Type field, Sub Type, Park Alpha, Work Category, Target Start Date, and Target Completion Date.

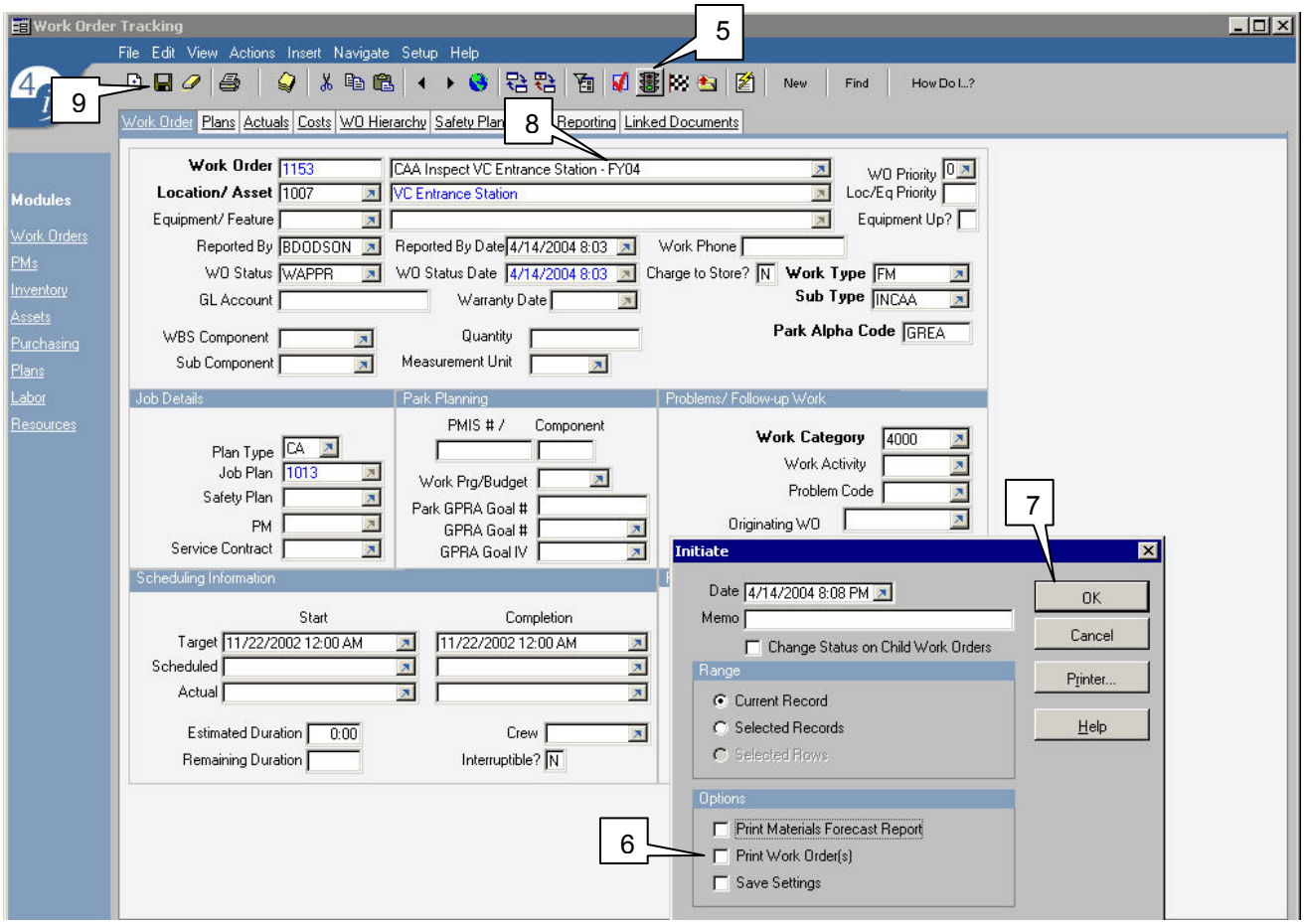


Figure 89: Condition Assessment Work Order—INPRG

5. Select the Initiate Work Order icon (stoplight).
6. **For Training Purposes Only:** In the Initiate box that appears, uncheck the Print Work Order(s) box so that the inspection worksheet is not printed in this class.
7. Select OK. This will automatically change the status to INPRG (in progress).

   NOTE: If a park has special approval procedures, these procedures should be discussed at that park unit.

8. Some parks are opting to include the fiscal year in the description to help distinguish condition assessment work orders from year to year.
9. Save.
10. Run the CAWOAPR2 report for the specific Condition Assessment Work Order, which produces a CA Plan. This CA Plan can be used as an inspection checklist to take into the field when conducting the condition assessment inspections. From the Work Order module, Work Order

Tracking Application, choose the reports icon (stacked papers), select the CAWOAPR2 report, and print the report.

11. Run the WOCALD report. This report lists deficiencies that have already been identified during past condition assessments. Inspectors should consult this report to ensure that they are not reporting issues that have already been identified.
12. Print the inspection guidance document for the asset being inspected. This document will also assist the inspectors. To download the inspection guidance documents, go to: http://inside.nps.gov/waso/custommenu.cfm?lv=4&prg=190&id=328

Step 7. Conduct the Condition Assessment Inspection and Record the Inspection Time Actuals

Complete the condition assessment. During the condition assessment, be sure to record the deficiencies and the deficiency rating for each deficiency as well as the corrective action required to remedy the deficiency. Carefully record measurements, types of materials, and quantities for each deficiency. See Chapter 4 for more information.

Figure 90: Trail Condition Assessment

After completing the assessment, record inspection time in the actuals on the condition assessment work order.

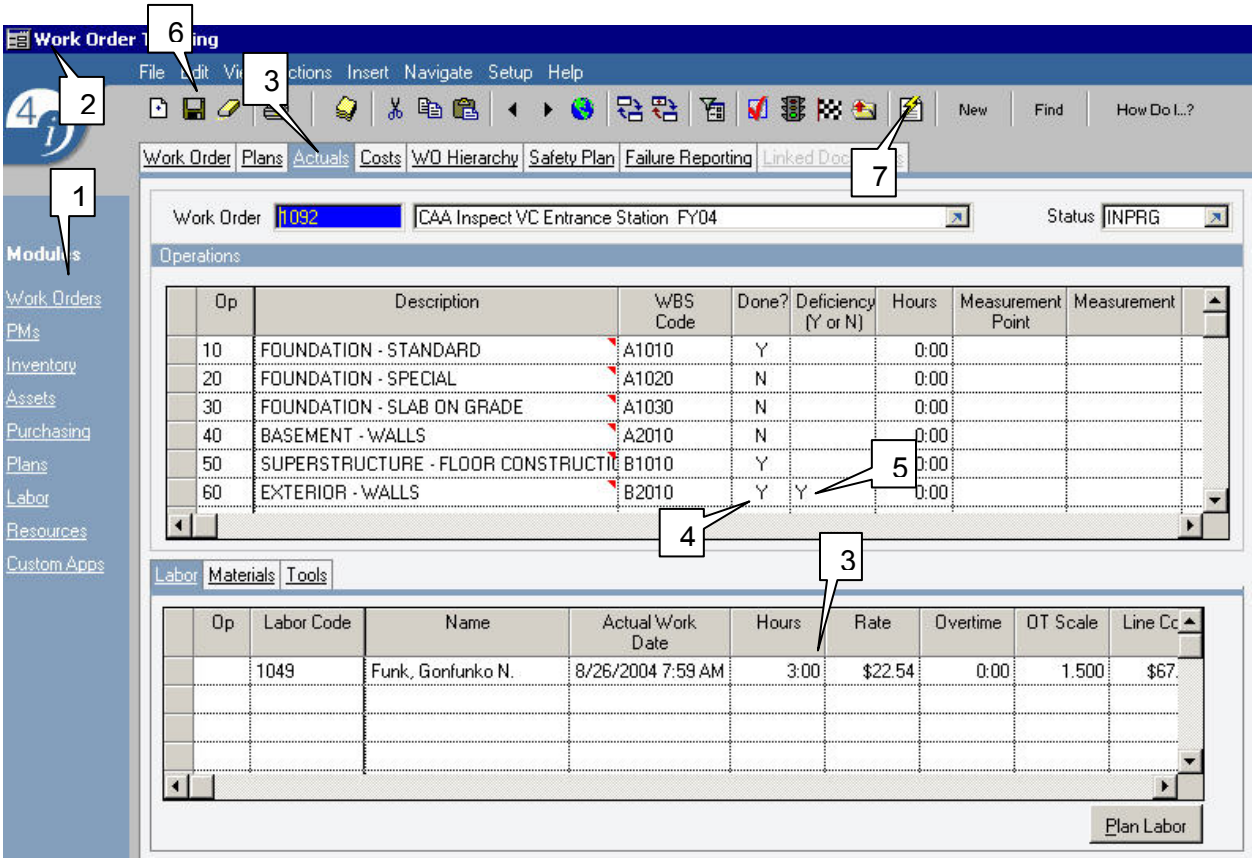


Figure 91: Record Actions on the Condition Assessment Work Order

FMSS

* Launch FMSS

1. Open the Work Order module.
2. Select the Work Order Tracking application.
3. Open the condition assessment work order for the asset on which the inspection was completed. Select the Actuals tab and record the time spent inspecting.
4. For operational steps inspected, place a Y in the Done? column if they have been inspected.

FMSS

5. Enter Y in the Deficiency Y/N column if a deficiency was identified. Scroll to the right and enter inspector information and date.
6. Save.
7. Click the Generate Follow-Up WO icon. In the box that opens, click the Autonumber button, and the OK button.

CAUTION

Generating a follow-up work order duplicates the original work order. The data in the record will need to be changed in order to reflect the new work order.

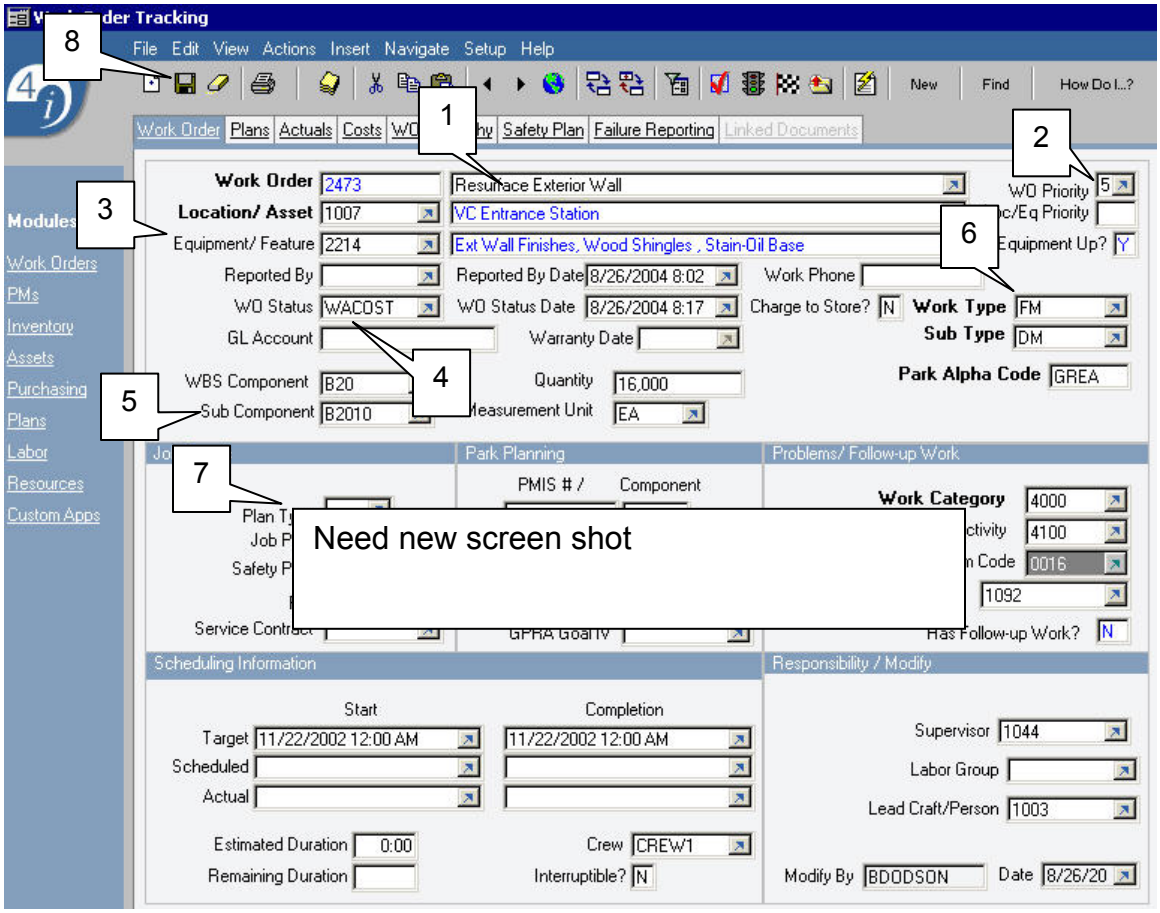


Figure 92: Follow-up Work Order

Step 8. Create Follow-Up Work Orders

For each corrective action, you must generate a follow-up work order from the original condition assessment work order.

1. In the new work order that opens, change the title to describe the work that will be done and record the deficiency and scope in the long description.
2. Select WO priority. See page 74 for descriptions of priorities.
3. Select the Equipment/Feature that requires corrective action (only if it applies to an equipment/feature).
4. Set WO status to WACOST.
5. Verify and enter, if necessary, both the WBS Component and Sub Component, and the Quantity and Measurement Unit of the deficient equipment/feature.
6. Enter the correct work type and sub-work type.
7. Delete the letters “CA” from the Plan Type field.
8. Save record.

Repeat steps for each deficiency identified, by going back to the Condition Assessment (CA) Work Order and using the generate follow up Work Order icon.

Step 9. Close the Condition Assessment Work Order

CAUTION Users are about to close the work order; after this step, users will not be able to add actuals, or other information to this work order. Occasionally, a park may miss a deficiency in first inspections or in data entry. In this case, the park can rectify this situation by taking one of two actions. If the deficiency is just another item of a feature already identified as deficient (110SF of roof instead of 95SF), then simply edit the existing work order. If the deficiency is a separate feature of the asset, then create a new deficiency WO and record the necessary information.

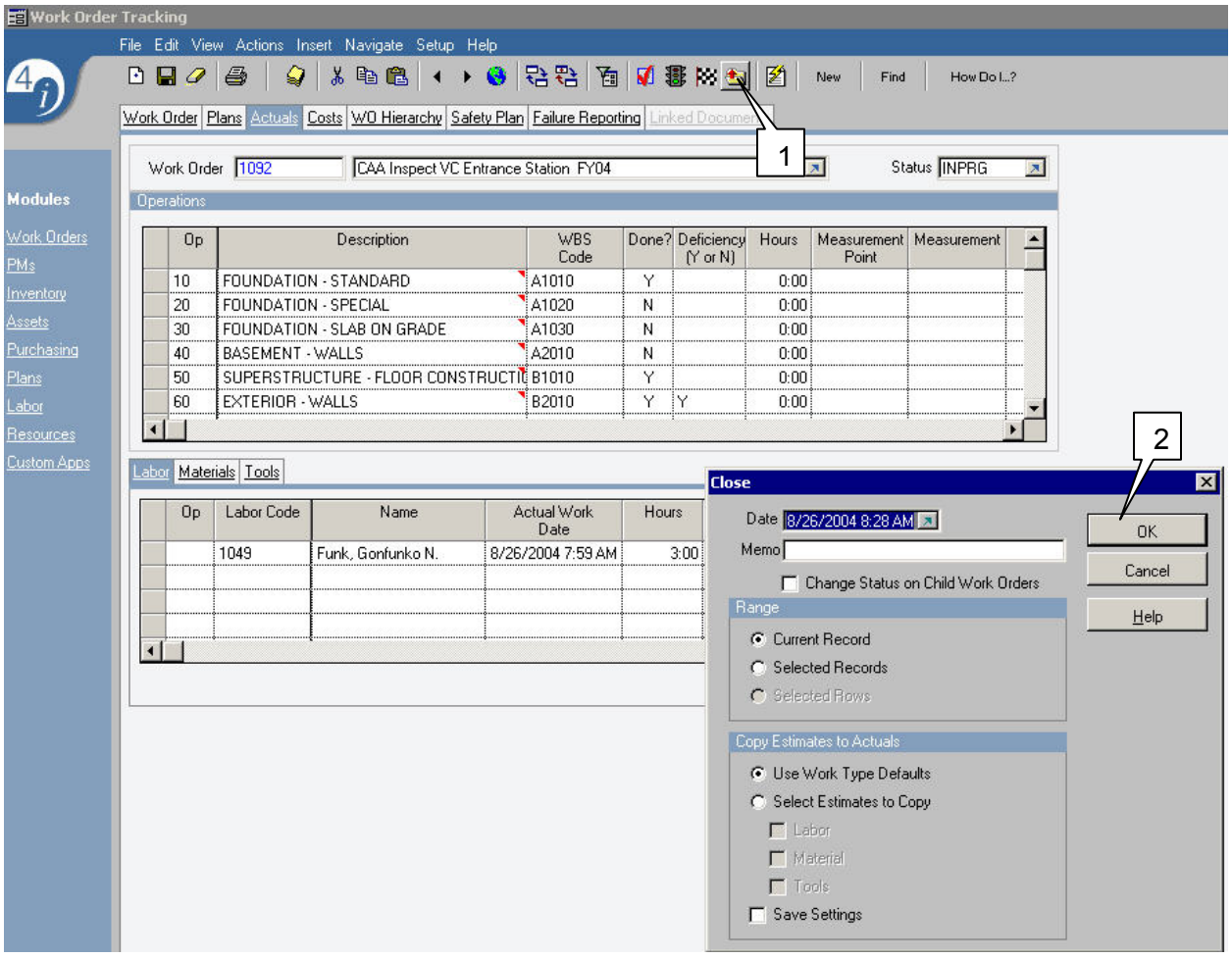


Figure 93: Close the Condition Assessment Work Order

Once all of the follow-up work orders have been generated, close the original condition assessment work order.

1. Close the work order by selecting the Close Work Order icon (file folder with red arrow).
2. When the Close box appears, select the OK button.

The Work Order Status will automatically change to CLOSE.

NOTE:

- A follow-up work order cannot be generated from a CLOSED condition assessment work order. Instead, the user may choose to change the work order to COMPLETED.

- On the deficiency work orders, users must have codes entered into the WBS component and sub component fields.

- If the corrective action information is saved in another electronic document (such as Microsoft Word, individual cells in Microsoft Excel, e-mail, etc.), copy or cut and paste that information into the long description.

Step 10. Ensure Data Is Complete in Follow-Up Work Orders

Record the deficiencies and corrective actions in the long description of the work order. Verify that WO Status is WACOST, WBS component, sub-component, work type, and sub-type are correctly filled in.

Step 11. Estimate Corrective Actions with CESS

At this point in the process, corrective actions can be estimated using CESS. Parks will do a cost estimate for each deficiency work order.

1. The interface from FMSS (Maximo) to CESS (Timberline) is initiated by selecting the Costs tab in FMSS.
2. Make sure that the deficiency work order to be COSTED is showing in the Work Order description field and it has the status of WACOST.
3. Select the CESS Estimate button to open CESS. This button will move you to CESS and either
   - Create a new estimate for the work order, or
   - Open an existing estimate for updating or review.

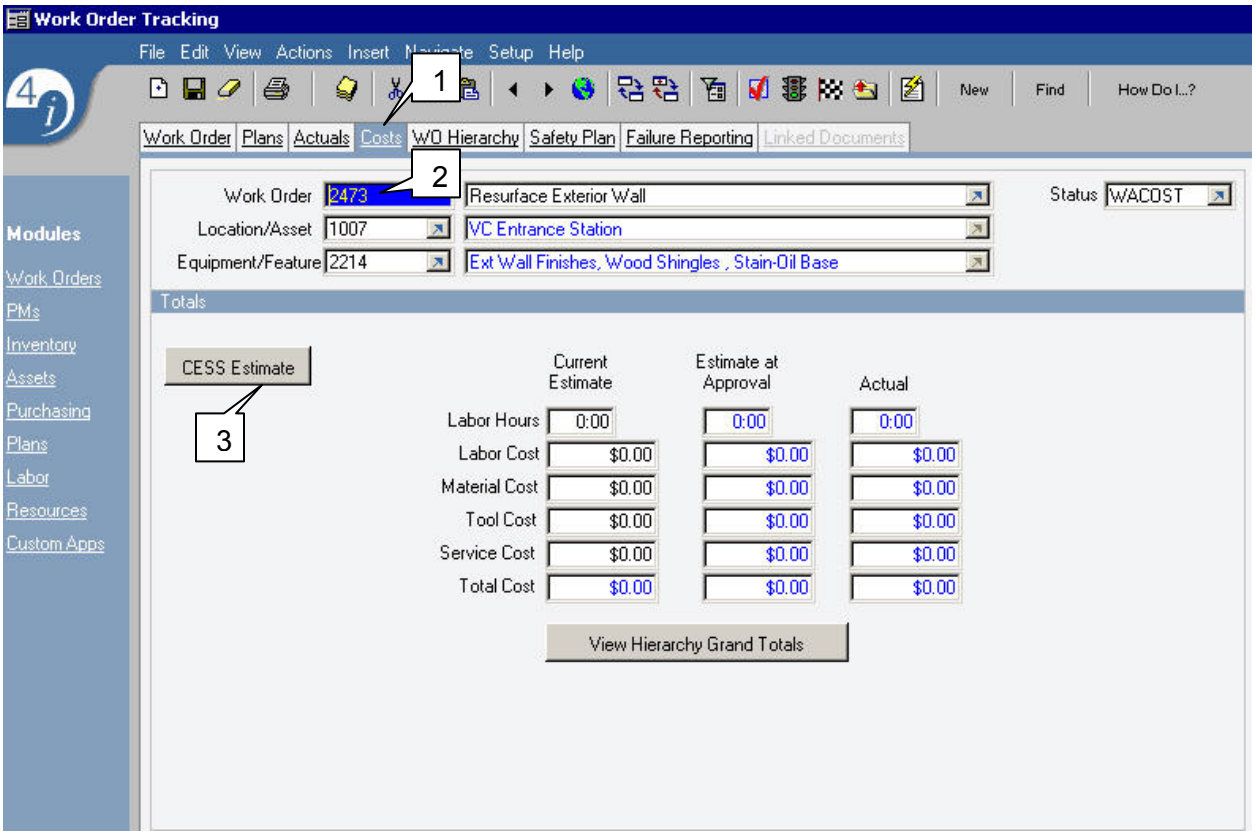


Figure 94: Costs Tab with CESS Button

CAUTION For training purposes only, users will create new estimate files. However, in the normal work process, estimate files will be created automatically.

* Click on to create a New Estimate. The following window opens.

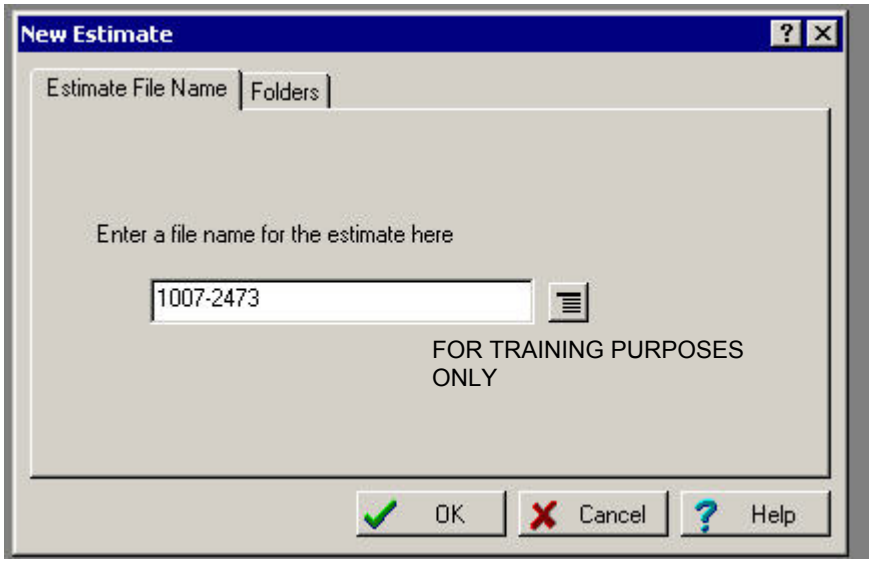


Figure 95: New Estimate (For Training Purposes Only)

4. Enter the exercise file name as 'Location/Asset Number—Deficiency Work Order Number'.
5. Click OK to continue to the Estimate Information window.

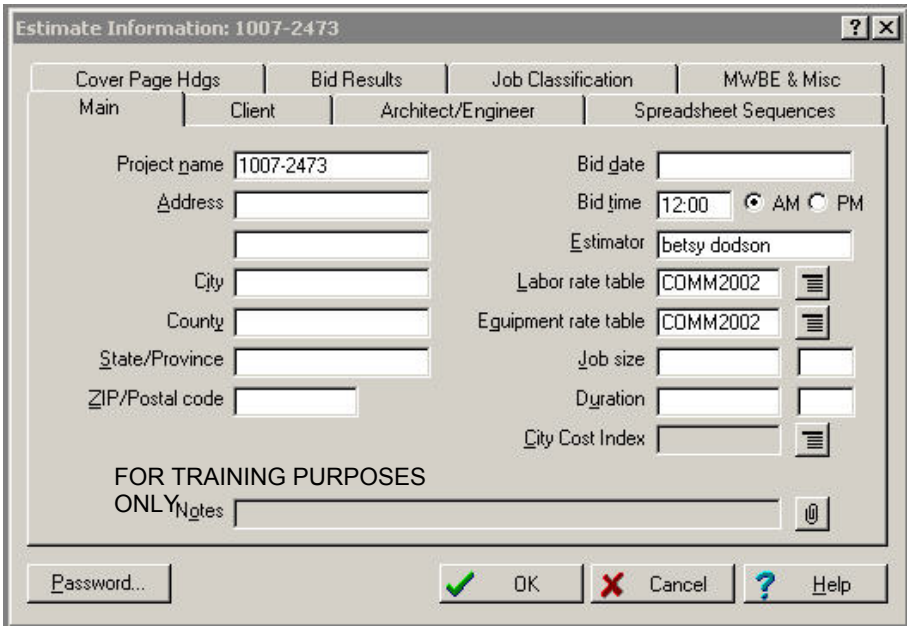


Figure 96: Estimate Information Window (For Training Purposes Only)

6. Enter your first and last name in the "Estimator" field, and then click OK. This generates a blank spreadsheet, in which you can begin to cost the estimate.

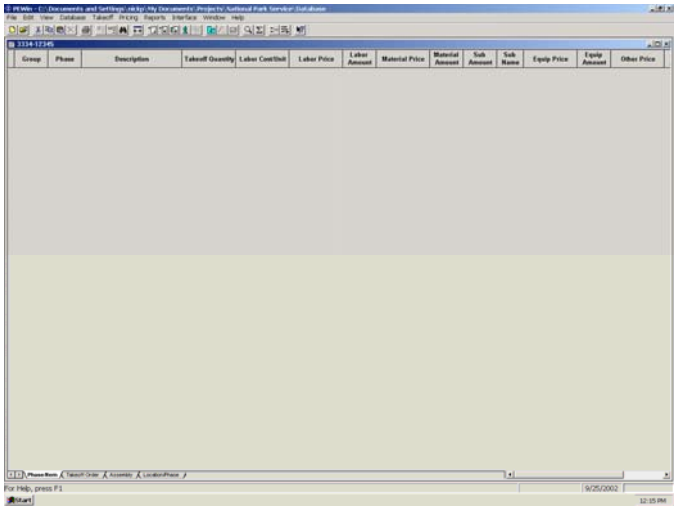


Figure 97: Empty Spreadsheet

.

7. Perform takeoffs by copying items into the estimate spreadsheet using any or all of the takeoff methods described in the exercises:
   - Assembly Takeoff
   - Item Takeoff
   - Quick Takeoff

8. Review the list of items on the spreadsheet to ensure all the correct items and quantities are listed. Add or delete items as necessary and appropriate. Remember: DO NOT modify costs or crews on the items.

9. Click on the Totals button to review the total estimate cost. The Totals window below will appear.

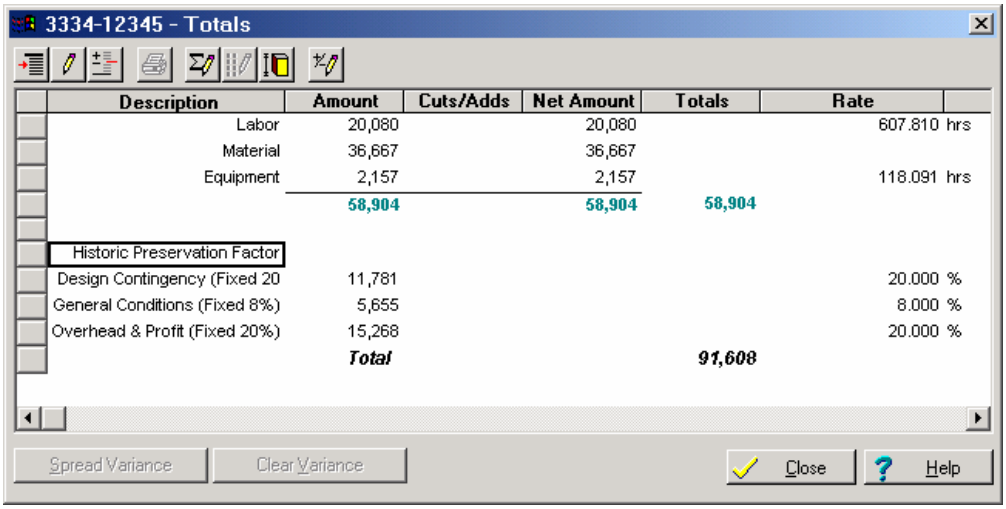


Figure 98: Totals Window

10. Review the estimate totals to ensure that the costs are reasonable and that they make sense for the project. If necessary, go back to the spreadsheet to add or delete items and/or make adjustments to the item quantities. Return to the Totals window for a final review.

Users have now completed the deficiency work order estimate and the CESS process, and are ready to update FMSS with your CESS cost estimate.

11. After the final review, close the estimate. The system prompts for the transfer of the data from the CESS estimate to the associated FMSS deficiency work order. Click **Yes** to start the updating process.

12. The system will validate the cost estimate figures and detects changes to the cost data in the estimate. The CESS estimate cost data is not transferred to FMSS and the system displays an error message.

13. Users *must* fix the errors prior to transferring the estimate cost data to FMSS. To fix the errors, locate the items that were identified on the error list and correct these values.

14. When any errors have been fixed, close CESS. The system will prompt you to transfer the data from the CESS estimate to the associated FMSS deficiency work order. Click Yes to start the updating process.

15. The costs are transferred into FMSS within the associated FMSS deficiency work order. Refresh the work order so that you can view these costs.

Step 12. Refresh the Follow-Up Work Order to View CESS Data

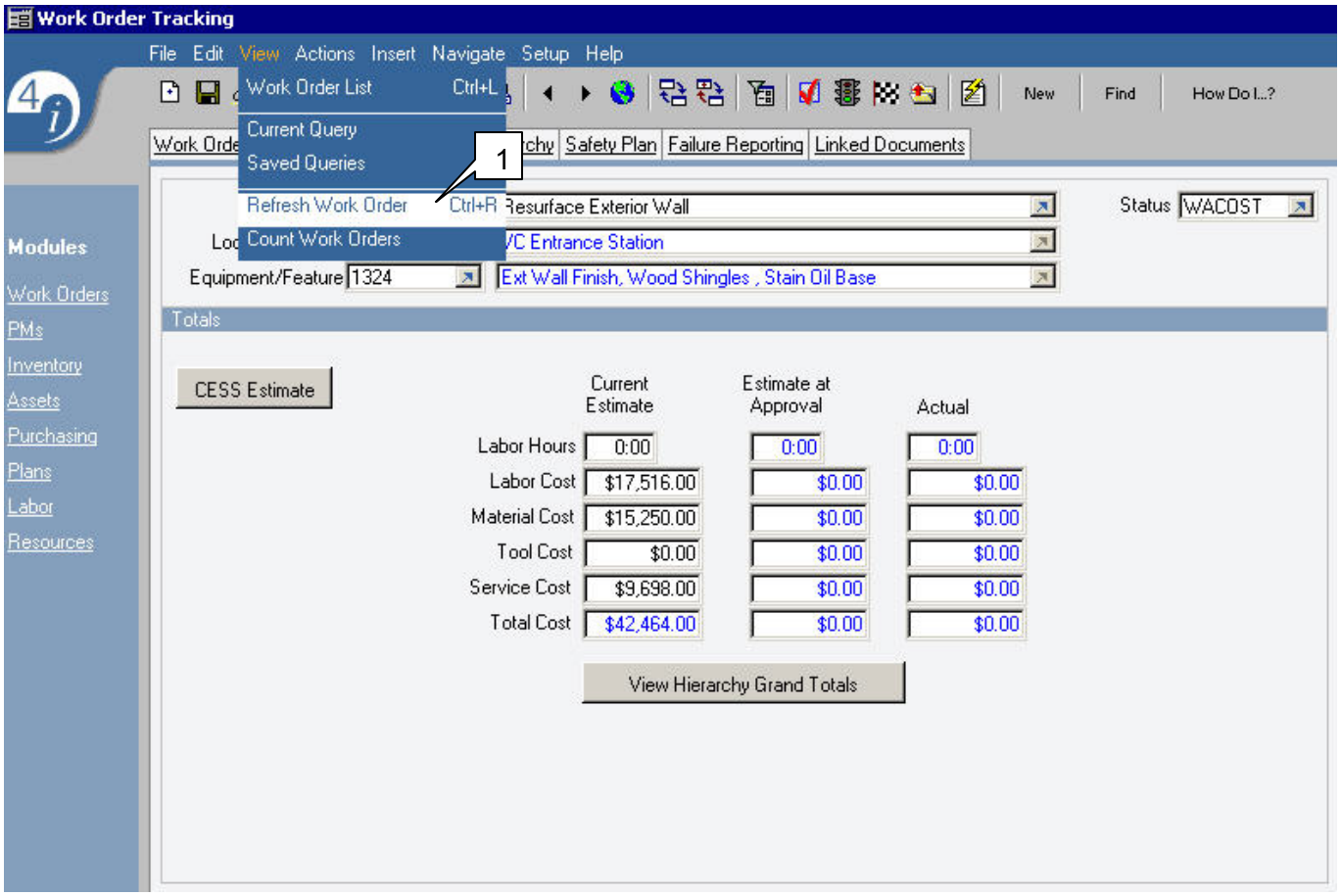


Figure 99: Cost Data Transferred from CESS to FMSS

* Confirm you are in the Cost Tab.

1. Refresh the follow-up work order related to the inspection cost estimate. To refresh, go to View on the menu bar and select Refresh Work Order.

NOTE: For Training Purposes the cost numbers have to be manually entered to complete the process.

Step 13. Change the Status Field to COSTED

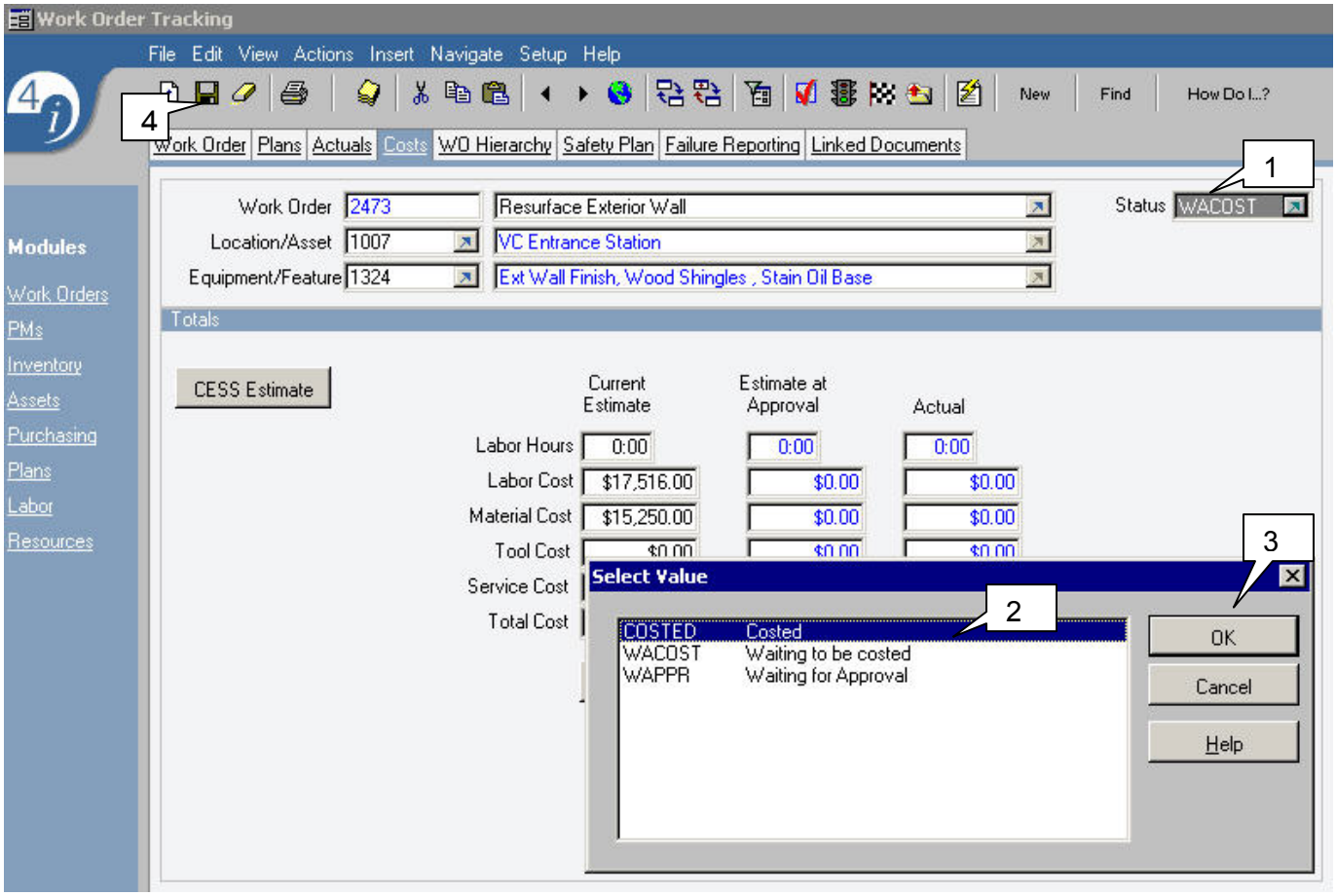


Figure 100: Change the Status Field to COSTED

1. Change the status of the deficiency work order to COSTED in the Status field. To do this, select the detail button.
2. Choose COSTED option in the Select Value pop-up screen.
3. Select OK.
4. Save the Work Order.

CAUTION If you do not change the DM work order to COSTED, the FCI will not adjust on the Location/Asset record. This must be done before the work order is approved or changed to INPRG.

Step 14. Review Deferred Cost and FCI

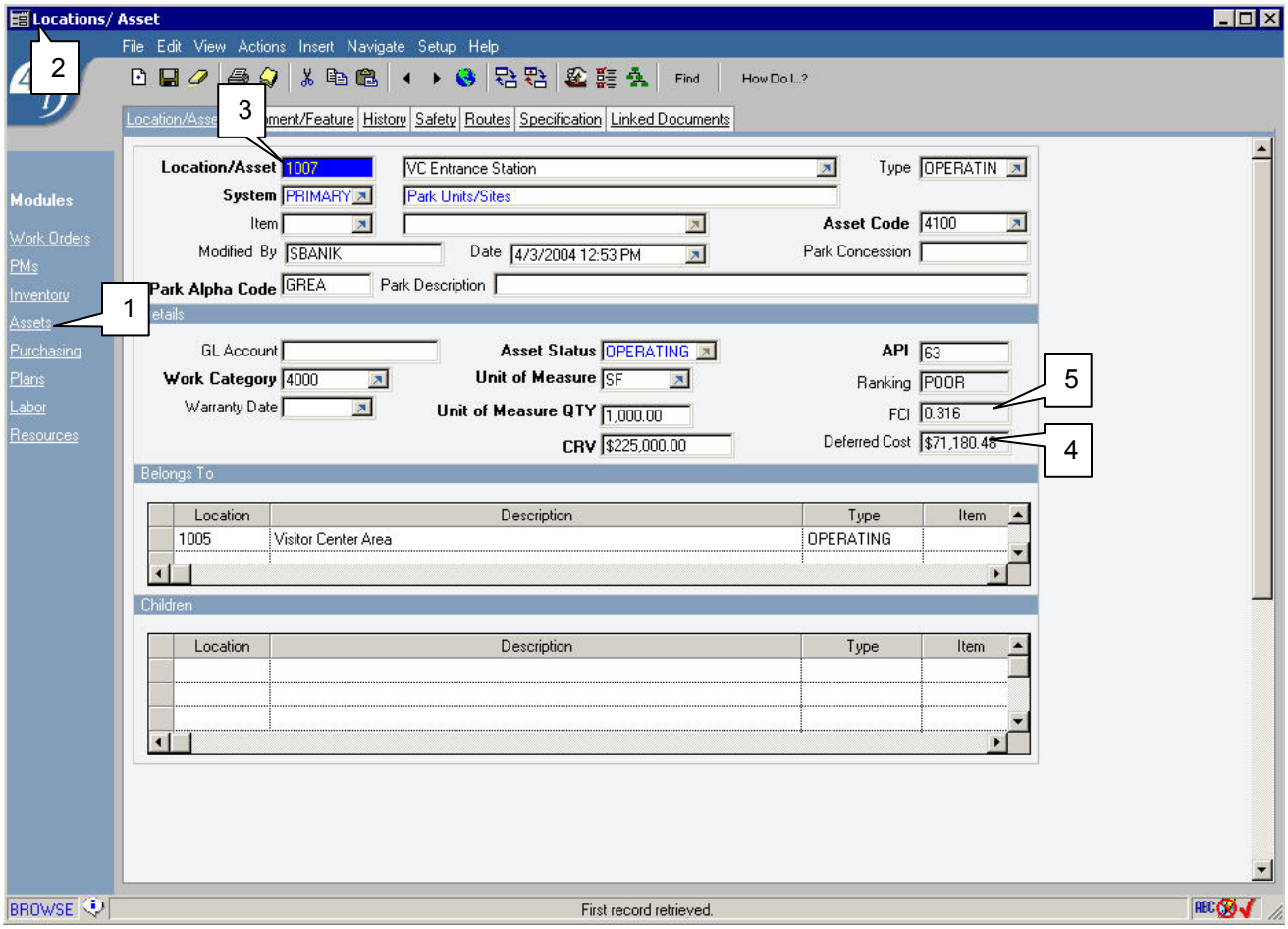


Figure 101: Review Deferred Cost of Asset and the FCI

1. Open the Asset module.
2. Select the Location/Asset application.
3. Enter the asset number in the Location/Asset field and hit enter. This will bring up the asset's record.
4. View the deferred costs. The Deferred Maintenance cost should be a total of all the deficiency work orders entered in prior steps, whether DM, CRDM, RMDM, or IPH.
5. Users will now see the FCI value. See Chapter Two to review the importance of the FCI and how it aids in ranking the priorities of assets.

Creating Work Orders and Packaging of Work Orders

When completing condition assessments, and creating the subsequent work orders, assessment teams should *not* make one or two large parent work orders per asset. While doing so might reduce FMSS data input time, creating parent work orders for each asset would greatly complicate cost estimating, reduce valuable reporting capabilities, limit flexibility in work planning and reporting, and negatively affect overall facility management in the park unit. To be efficient and effective, one should package work orders under a parent work order only (1) when planning for accomplishments and (2) when it makes sense to package them by systems/component work to be done at the same time or by similar work types or across facilities.

Completion of Deficiency Work Orders

As parks correct deficiencies, they will return to FMSS, open the deficiency work order(s), approve them, and enter actual hours and costs for completing the work; then they will close the work order.

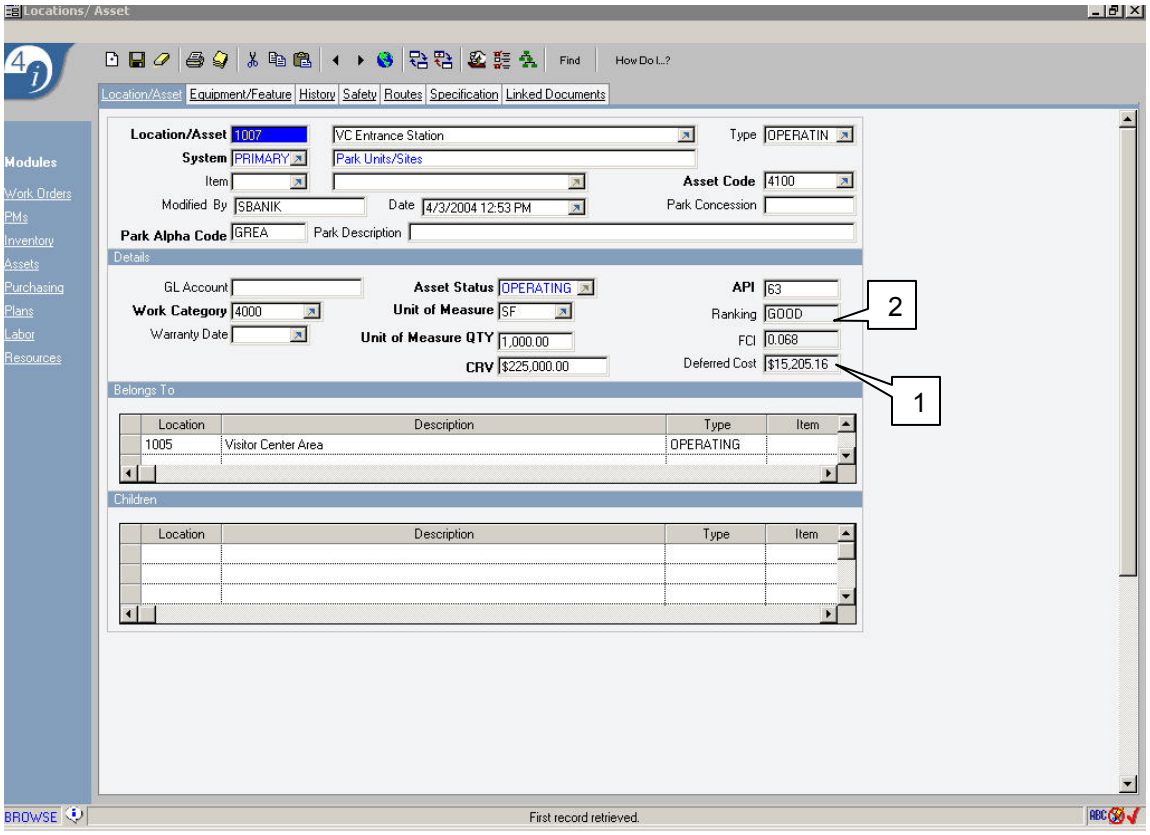


Figure 102: The FMSS as a Management Tool

1. Go to the asset record. The deferred cost amount has decreased to reflect the completion of the deficiency work order.
2. The ranking may or may not improve.

Projects may be funded that include repair of some of the deficiencies identified by the Facility Condition Assessment Survey. A work order hierarchy can be developed to bundle a number of deficiency work orders, making them children to the project parent. If the project requires additional work beyond that identified by the deficiency work orders, additional child work orders of any work type can be added to make up a complete project. As the project is completed, actual hours, materials and tools should be tracked to the appropriate child work order. The completed deficiency work orders will remove the deferred costs from the FCI.

Thus, the data entered into the FMSS as part of the Facility Condition Assessment Survey allows your park and management team to track the improvement of assets over time, an important evaluation tool in the Asset Management Process.

Future Completion of Condition Assessments

A Condition Assessment Annual (INCAA) should be performed every year, except for those years in which a Condition Assessment Comprehensive (INCAC) is performed. This allows parks to check on the condition of your assets as well as to keep the FMSS and CESS data current. Over the next few years, park units should expect to edit both condition assessment and cost data to reflect additional deficiencies that may be identified during future Condition Assessments. Future years provide park units with the opportunity to refine the information and to keep it up-to-date.

When performing condition assessments in subsequent years, should you find no additional deficiencies, you should still generate a new condition assessment work order. In the long description, make a note that no additional deficiencies were found, capture your inspection time under Actuals, and close the work order.

Chapter Six—Review of Key Points

- _____
- _____
- _____
- _____
- _____

Resources

Where to Go for Help
CESS Resources: CESS Phases—CSI Masterformat 1995 Specification
CESS Resources: CESS NPS Assemblies—Uniformat 1998 Specification
CESS to FMSS Data Relationships
CESS Actions Reflected in FMSS
Units of Measure
NPS Glossary:
- **General Terminology**
- **Facility Management Software System Terminology**
  - **Asset Attributes**
  - **Equipment Attributes**
- **Acronyms**

Bibliography
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Where to Go for Help

WHERE TO GO FOR HELP

Once you get back to your park and begin to use the software, you will very likely have questions. To get answers to your questions, you should consult the following sources. They are listed in the order of suggested action. When you have questions, you ought first to attempt to discover the answers on your own; your comfort with the software will develop more quickly if you seek answers independently than it will if you will ask others to supply the answers for you. Recommended help resources are below.

1. "What's This?"
   (Right click on any field in FMSS to be presented with this option)

2. Software help screen

3. FMP HelpDesk website and FAQs http://pfmd.nps.gov/cfapps/fmss/helpdesk/

http://pfmd.nps.gov/cfapps/fmss/helpdesk/
NATIONAL PARK SERVICE
PARK FACILITY MANAGEMENT
Facility Management for the 21st Century
FMP HelpDesk
System Status: FMSS Production: OPERATIONAL, CESS Production: OPERATIONAL. FMSS Training: OPERATIONAL, CESS Training: OPERATIONAL. To use CESS Training change from the "R" drive to the "S". CORRUPT CESS PROD DATABASE IS REPAIRED. 20020802 14:10edt
FAQs
Frequently Asked Questions
&
HelpDesk Requests
FMSS Report Request
This site is designed to assist users with FMSS and FCAS questions.
From this page you will be able to view or search any or all questions submitted to the HelpDesk. You will also have the capability of submitting questions of your own to the HelpDesk. If you are new to this site or you simply need assistance before you get started, please click here.
Contact Information
Contact Phone: (303)969-2609
Hours of Operation: Monday-Friday 6:00am to 2:30pm mountain standard time

4. Course instructor, if post class assignments are not completed

   _____

5. Park account manager, if post class assignments have been completed

   _____

6. FMSS HelpDesk e-mail — FMSS Help Desk (in Lotus Notes) or FMPSS_Help_Desk@nps.gov

7. HelpDesk phone — 303-969-2609

CESS Resources: CESS Phases—CSI Masterformat 1995 Specification

CESS RESOURCES:
CESS Phases—CSI Masterformat 1995 Specification (Modified)

Legend	CSI Masterformat level	CESS	Example
	Level 1	Group Phase	**02000.000 SITE CONSTRUCTION**
	Level 2	Group Phase	**02200.000 SITE PREPARATION**
	Level 3	Phase	02210.000 Subsurface investigation
	Level 4	Phase	02210.310 Borings

00010.000 CUSTOM NPS ITEMS
00010.050 Extra Labor Cost
00011.050 Picnic Tables
00011.060 Containers/Lockers
00012.050 Grills and Fire Circles
00013.050 Fee Station Items
00014.050 Dump Station Items
00015.050 Trails Items
00016.050 Boardwalk Items
00017.050 Electrical Items
00018.050 Rolling Stock Unique Item
00019.050 Log Structure Items
00400.000 BID FORMS & SUPPLEMENTS
00430.000 Bid form supplements
00430.140 Crew c-14
00430.160 Crew e-2
00430.280 Wage rates
01000.000 GENERAL REQUIREMENTS
01100.000 SUMMARY
01103.000 Models & renderings
01103.200 Models
01103.500 Renderings
01107.000 Professional consultant
01107.700 Surveying
01300.000 ADMNSTRTV REQUIREMENTS
01310.000 Project mangmnt/crdntn
01310.700 Field personnel
01320.000 Cnstrtn progrss documents
01320.200 Scheduling
01321.000 Construction photos
01321.500 Photographs
01400.000 QUALITY REQUIREMENTS
01450.000 Quality control
01450.500 Field testing
01500.000 TEMPORY FACILITS&CONTROLS
01510.000 Temporary utilities
01510.050 Tm pw eq (pr-rtd per job)
01510.800 Temporary utilities
01520.000 Construction facilities
01520.500 Office
01520.550 Field office expense
01520.900 Weather station
01530.000 Temporary construction
01530.700 Protection
01530.900 Winter protection
01540.000 Construction aids
01540.500 Persnnl protctv equipment
01540.550 Pump staging
01540.700 Safety nets
01540.750 Scaffolding
01540.755 Scaffolding specialties
01540.760 Staging aids
01540.780 Swing staging
01540.790 Surveyor stakes
01540.800 Tarpaulins
01550.000 Vehicular access&parking
01550.700 Roads and sidewalks
01560.000 Barriers & enclosures
01560.100 Barricades
01560.250 Fencing
01560.800 Watchman
01580.000 Project signs
01580.700 Signs
01590.100 Concrete equipment rental
01590.200 Earthwk equip rental with
01590.400 General equipment rental
01590.600 Lifting and hoisting equi
01590.700 Wellpoint equipment rent
01700.000 EXECUTION REQUIREMENTS
01740.000 Cleaning
01740.500 Cleaning up
01800.000 FACILITY OPERATION
01830.000 Operation and maintenance
01830.117 Crew b-1 (per hr.)
01830.118 Crew c-11 (per hr.)
01832.360 Elctrcl facilts maintenc
02000.000 SITE CONSTRUCTION
02050.000 BASIC SITE MATRLS&METHODS
02060.000 Aggregate
02060.150 Borrow
02065.000 Cement & concrete
02065.300 Asphaltic concrete
02080.000 Utility materials
02080.400 Fire hydrants
02080.790 Underground marking tape
02080.800 Utility vaults
02080.900 Piping valves
02100.000 SITE REMEDIATION
02110.000 Excavatn,removal&handling
02110.300 Hazards waste clnp/pckp/
02115.000 Underground tank removal
02115.200 Remvl undrgr storag tanks
02200.000 SITE PREPARATION
02210.000 Subsurface investigation
02210.310 Borings
02210.320 Drilling, core
02210.900 Test pits
02220.000 Site demolition
02220.100 Building demolition
02220.400 Explosv/mplsv demolition
02220.550 Ftngs and fndtns demolitn
02220.575 Hydrodemolition
02220.875 Site demolition
02225.000 Selective demolition
02225.310 Ceiling demolition
02225.320 Cutout demolition
02225.340 Door demolition
02225.380 Flooring demolition
02225.390 Framing demolition
02225.400 Gutting
02225.610 Masonry demolition
02225.620 Millwrk and trim demolitn
02225.690 Roofng and siding demoltn
02225.720 Disposal only
02225.730 Rubbish handling
02225.740 Dump charges
02225.760 Saw cutting
02225.790 Torch cutting
02225.840 Walls and prttns demolitn
02225.850 Window demolition
02230.000 Site clearing
02230.200 Clear and grub
02230.220 Clearing
02230.250 Felling trees & piling
02230.280 Selective clearing
02230.880 Stripping
02240.000 Dewatering
02240.500 Dewatering
02240.700 Wells
02240.900 Wellpoints
02250.000 Shoring & underpinning
02250.050 Grouting, pressure
02250.100 Underpinning foundations
02250.400 Sheet piling
02250.500 Shoring
02250.900 Vibroflotation
02260.000 Excavation support/prtctn
02260.700 Slurry trench
02260.850 Soldier beams & lagging
02300.000 EARTHWORK
02305.000 Equipment
02305.250 Mobiliztn demobilization
02310.000 Grading
02310.440 Fine grade
02310.460 Loam or topsoil
02315.000 Excavation and fill
02315.100 Backfill
02315.120 Backfill, structural
02315.130 Bedding
02315.200 Borrw,ldng and/or sprdng
02315.300 Compaction
02315.320 Compaction, structural
02315.340 Drilling and blasting
02315.345 Drilling only
02315.400 Excvtng,bulk bank measure
02315.410 Excavating, bulk, dozer
02315.430 Excavation,bulk,scrapers

02315.500 Fill

02315.505 Fill
02315.900 Excavating, trench
02315.940 Excavating,utility trench
02320.000 Hauling
02320.200 Hauling
02325.000 Dredging
02325.250 Dredging
02340.000 Soil stabilization
02340.160 Calcium chloride
02360.000 Soil treatment
02360.800 Termite pretreatment
02370.000 Erosion&sedimentn control
02370.300 Rip-rap
02370.550 Erosion control
02390.000 Shore prtct/mrn strtures
02390.220 Docks
02400.000 TUNNELING,BORING&JACKING
02420.000 Initl tunnl suppr systems
02420.700 Rock bolts
02441.000 Microtunneling
02441.400 Microtunneling
02445.000 Boring jacking conduits
02445.300 Horizontal boring
02450.000 FNDTN&LOAD BEARNG ELEMNTS
02455.000 Driven piles
02455.220 Piles, concrete
02455.350 Piling special costs
02455.500 Mobilization
02455.850 Piles, steel
02455.900 Piles, wood
02465.000 Bored piles
02465.600 Caissons
02465.800 Pressur injected footings
02500.000 UTILITY SERVICES
02510.000 Water distribution
02510.350 Distribution connection
02510.800 Pipng,water dstrb systems
02510.820 Ppng,watr dstr,ductl iron
02510.830 Ppng,watr dstr,plyth,c901
02510.840 Ppng,watr dstr,plyv chlrd
02510.850 Ppng,hdpe butt fusn jnts
02510.920 Pipng,water dstrbt,copper
02520.000 Wells
02520.900 Wells
02520.910 Pumps, well
02530.000 Sanitary sewerage
02530.100 Sewage treatment
02530.105 Valves
02530.730 Pipng,drng&sewage,concret
02530.780 Ppng,drng&sewg,plyv chlrd
02530.790 Ppng,drng&sewg,vtrfd clay
02540.000 Septic tank systems
02540.700 Septic tanks
02550.000 Piped energy distribution
02550.450 Gas station product line
02550.464 Ppng,gas srvc&dstr,plythy
02550.550 Pipe conduit,prefabrctd
02580.000 Elec/commnctn strtures
02580.250 Condt instl direct burial
02580.300 Electrc&telephn site work
02580.890 Radio towers
02600.000 DRAINAGE & CONTAINMENT
02620.000 Subdrainage
02620.210 Piping,subdraing,concrete
02620.240 Pipng,sbdrng,corrgt metal
02620.250 Piping,subdraing,plastic
02620.280 Piping,sbdrng,vitrfd clay
02630.000 Storm drainage
02630.100 Ppng,strm drng,corr metal
02630.200 Catch basins or manholes
02700.000 BASES,BALLS,PVMNT&APPRTNC
02720.000 Unbnd base courss&ballsts
02720.200 Base course
02720.215 Base
02740.000 Flexible pavement
02740.300 Asphltc concrete pavement
02740.315 Paving
02750.000 Rigid pavement
02750.100 Concrete pavement
02766.000 Pavement markings
02766.550 Lines on pav't
02770.000 Curbs and gutters
02770.225 Curbs
02775.000 Sidewalks
02775.275 Sidwlks,drivwys,& patios
02778.000 Steps
02778.280 Steps
02780.000 Unit pavers
02780.100 Asphalt blocks
02780.200 Brick paving
02780.600 Prcst concrt paving slabs
02780.650 Planter blocks
02780.800 Stone pavers
02785.000 Flexible pavement coating
02785.800 Sealcoating
02790.000 Athltc/rcrtnl surfaces
02790.400 Turf, artificial
02790.850 Tennis court
02790.900 Running track
02800.000 SITE IMPRVMN AND AMENITS
02810.000 Irrigation system
02810.800 Sprinkler irrigatn system
02810.900 Subsurfac drip irrigation
02815.000 Fountains
02815.225 Fountains/aerators
02820.000 Fences & gates
02820.500 Fence, misc. metal
02820.528 Fence,chain link industrl
02820.530 Fence,chain link residntl
02820.890 Wire fencing
02820.925 Fence, rail
02830.000 Retaining walls
02830.100 Retaining walls
02830.400 Stone wall
02840.000 Wlk/rd/pr appurtenances
02840.155 Bumper rails
02840.200 Traffic control devices
02840.500 Guide/guard rail
02840.600 Highway sound barriers
02840.700 Parking barriers
02850.000 Prefabricated bridges
02850.210 Bridges
02870.000 Site furnishings
02870.610 Benches
02870.800 Trash receptacle
02870.815 Trash closure
02880.000 Playfield equipment
02880.100 Bleachers
02880.140 Backstops
02880.225 Goal posts
02880.700 Playground equipment
02880.710 Modular playground
02880.880 Pltfrm/pd tennis court
02890.000 Traffic signs & signals
02890.700 Signs
02890.900 Traffic signals
02900.000 PLANTING
02905.000 Transplanting
02905.725 Planting
02910.000 Plant preparation
02910.500 Mulch
02912.000 General planting
02912.275 Ground cover
02920.000 Lawns & grasses
02920.500 Seeding
02920.600 Sodding
02930.000 Exterior plants
02930.050 Shrubs and trees
02930.410 Shrubs
02930.680 Plant bed preparation
02930.900 Trees
02945.000 Planting accessories
02945.310 Edging
02945.500 Planters
02945.775 Tree guying
02950.000 SITE RESTORATN&REHABILITN
02955.000 Restrtn undergrnd piping
02955.100 Pipe intrnl clnng&inspctn
02955.680 Pipe repair
02955.700 Lining pipe
02955.800 Corrosion resistance
02990.000 Structure moving
02990.300 Moving buildings
03000.000 CONCRETE
03050.000 BASIC CNCRT MTRLS&METHODS
03060.000 Basic concrete materials
03060.100 Cncrt admxt&surfc trtmnts
03060.110 Aggregate
03060.200 Cement
03060.850 Watrprfng and dampprfng
03060.870 Winter protection
03100.000 CONCRETE FORMS&ACCESSORSS
03110.000 Structural c.i.p. forms
03110.405 Fip,beams and girders
03110.410 Forms in place, columns
03110.415 Forms in place, culvert
03110.420 Fip,elevated slabs
03110.425 Fip,equipment foundations
03110.430 Forms in place, footings
03110.435 Forms place, grade beam
03110.440 Fip,mat foundation
03110.445 Forms place, slab grade
03110.450 Forms in place, stairs
03110.455 Forms in place, walls
03110.460 Fip,insulating concrete
03110.500 Gas station forms
03110.820 Slipforms
03150.000 Concrete accessories
03150.080 Accessories, anchor bolts
03150.160 Accessors,chamfer strips
03150.170 Accessories, column form
03150.200 Accss,dovtl anchor system
03150.250 Expansion joint
03150.350 Accessories, hangers
03150.400 Accessories, inserts
03150.600 Shores
03150.620 Accssr,sleeves and chases
03150.640 Accs,snap ties,flat washr
03150.660 Stair tread inserts
03150.850 Accssrs,wall and foundatn
03150.860 Waterstop

03200.000 CONCRETE REINFORCEMENT
03210.000 Reinforcing steel
03210.100 Accessories
03210.200 Coated reinforcing
03210.600 Reinforcing in place
03210.700 Splicing reinforcing bars
03220.000 Welded wire fabric
03220.200 Welded wire fabric
03230.000 Stressing tendons
03230.600 Prestressing steel
03240.000 Fibrous reinforcing
03240.300 Fibrous reinforcing
03300.000 CAST-IN-PLACE CONCRETE
03310.000 Structural concrete
03310.200 Concrete, field mix
03310.220 Concrete, ready mix
03310.240 Concrete in place
03310.700 Placing concrete
03350.000 Concrete finishing
03350.300 Finishing floors
03350.350 Finishing walls
03350.600 Slab texture stamping
03370.000 Specially placed concrete
03370.300 Gunite
03390.000 Concrete curing
03390.200 Curing
03400.000 PRECAST CONCRETE
03410.000 Plant precast
03410.100 Beams
03410.110 P.c. conc. beam
03410.200 Precast tied column
03410.210 Columns
03410.400 Joists
03410.620 Slabs
03410.650 Prestressed concrete
03410.750 Tees
03450.000 Architectural precast
03450.850 Wall panels
03470.000 Tilt-up precast
03470.600 Tilt-up
03480.000 Precast specialties
03480.400 Lintels
03480.800 Stairs
03500.000 CEMENTS DECKS&UNDRLYMNTS
03510.000 Cementitious roof deck
03510.200 Wood fiber
03510.250 Concrete channel slabs
03510.270 Concrete plank
03510.350 Formboard
03520.000 Lghtwt concret roof insul
03520.250 Insulating
03600.000 GROUTS
03610.000 Construction grout
03610.400 Grout
03900.000 CONCRET RESTRTN&CLEANING
03920.001 Concrete resurfacing
03920.600 Patching concrete
04000.000 MASONRY
04050.000 BASIC MSNRY MTRLS&METHODS
04060.000 Masonry mortar
04060.200 Cement
04060.400 Lime
04060.500 Mortar
04060.520 Pointing mortar
04060.540 Colors
04060.750 Sand
04060.770 Surface bonding
04060.900 Waterproofing
04070.000 Masonry grout
04070.420 Grouting
04080.000 Masonry anchor&reinfrcmnt
04080.070 Anchor bolts
04080.200 Reinforcing
04080.650 Wall ties
04090.000 Masonry accessories
04090.170 Control joint
04090.420 Insulation
04090.650 Pargeting
04090.860 Vent box
04090.900 Wall plugs
04200.000 MASONRY UNITS
04210.000 Clay masonry units
04210.100 Common building brick
04210.120 Brick veneer
04210.300 Face brick
04210.320 Structural brick
04210.350 Structural facing tile
04210.810 Terra cotta
04210.820 Terra cotta tile
04220.000 Concrete masonry units
04220.180 Atclv aeratd concrt block
04220.200 Chimney block
04220.220 Concrete block, back-up
04220.230 Concrete block bond beam
04220.240 Concrete block,decorative
04220.250 Concrete block, exterior
04220.260 Concrt block foundtn wall
04220.270 Concrt block,high strngth
04220.280 Concrete block, lintels
04220.300 Concrete brick
04220.305 Concrete brick,std size
04220.320 Concrete screen block
04220.340 Coping
04220.500 Concrete block,interlckng
04220.700 Glazed concrete block
04270.000 Glass masonry units
04270.200 Glass block
04290.000 Adobe masonry units
04290.100 Adobe brick
04400.000 STONE
04412.000 Bluestone
04412.100 Bluestone
04412.800 Window sill
04413.000 Granite
04413.300 Granite
04414.000 Limestone
04414.400 Limestone
04415.000 Marble
04415.500 Marble
04417.000 Sandstone
04417.700 Sandstone or brownstone
04418.000 Slate
04418.800 Slate
04420.000 Collected stone
04420.500 Lightweight natural stone
04420.750 Rough stone wall
04430.000 Quarried stone
04430.100 Ashlar veneer
04500.000 REFRACTORIES
04550.000 Flue liners
04550.250 Flue lining
04580.000 Refractory brick
04580.250 Fire brick
04580.260 Fire clay
04580.270 Fireplace
04700.000 SIMULATED MASONRY
04710.000 Simulated brick
04710.600 Simulated brick
04730.000 Simulated stone
04730.600 Simulated stone
04800.000 MASONRY ASSEMBLIES
04810.000 Unit masonry assemblies
04810.160 Chimney
04810.170 Columns
04810.180 Concrete block column
04810.210 Concrete block,partitions
04810.211 Concrete blocks
04810.540 Walls
04810.650 Walls
04810.670 Steps
04810.900 Brick veneer
04840.000 Prefbrctd masonry panels
04840.900 Wall panels
04900.000 MASONRY RESTRTN&CLEANING
04910.000 Unit masonry restoration
04910.600 Needle beam masonry
04910.750 Sawing
04930.000 Unit masonry cleaning
04930.200 Clean and point
04930.220 Cleaning masonry
04930.750 Steam clean
04930.900 Washing brick
05000.000 METALS
05050.000 BASIC MATERIALS & METHODS
05090.000 Metal fastenings
05090.080 Anchor bolts
05090.150 Bolts & hex nuts
05090.340 Drilling
05090.380 Expansion anchors
05090.420 High strength bolts
05090.460 Lag screws
05090.500 Machine screws
05090.540 Machinery anchors
05090.580 Powder actuated
05090.600 Rivets
05090.820 Vibration pads
05090.840 Weld shear connectors
05090.860 Weld studs
05090.880 Weld rod
05090.900 Welding structural
05090.920 Steel cutting
05100.000 STRUCTURAL METAL FRAMING
05120.000 Structural steel
05120.140 Subpurlins
05120.180 Canopy framing
05120.220 Ceiling supports
05120.260 Columns
05120.300 Curb edging
05120.440 Lightweight framing
05120.480 Lintels
05120.520 Pipe support framing
05120.560 Plates
05120.600 Stressed skin
05120.640 Structural steel members
05120.680 Structural steel projects
05140.000 Structural aluminum
05140.080 Aluminum
05150.000 Wire rope assemblies
05150.800 Steel wire rope
05160.000 Metal framing systems
05160.800 Space frame
05200.000 METAL JOISTS
05210.000 Steel joists
05210.600 Open web joists

05300.000 METAL DECKING
05310.000 Steel deck
05310.300 Metal decking
05400.000 COLD FORMED METAL FRAMING
05410.000 Load-bearing metal studs
05410.100 Bracing
05410.120 Bridging
05410.300 Framing,
05410.400 Framing, stud walls
05420.000 Cold-formed metal joists
05420.100 Bracing
05420.120 Bridging
05420.200 Framing, band joist
05420.300 Framing,boxed headrs/bms
05420.400 Lightgage "c" joist, galv
05420.410 Framing, joists
05420.500 Framing, web stiffeners
05460.000 Cold-formed roof framing
05460.100 Framing, bracing
05460.200 Framing, bridging
05460.500 Framing, parapets
05460.550 Framing, roof rafters
05460.600 Framing, roof trusses
05460.650 Framing,soffits&canopies
05500.000 METAL FABRICATIONS
05514.000 Ladders
05514.500 Ladder
05517.000 Metal stairs
05517.300 Fire escape
05517.350 Fire escape stairs
05517.700 Stair
05520.000 Handrails & railings
05520.700 Railing, pipe
05520.740 Railings, commercial
05520.780 Railings, industrial
05530.000 Gratings
05530.300 Floor grating, aluminum
05530.320 Floor grating planks
05530.340 Floor grating, steel
05530.360 Grating frame
05540.000 Floor plates
05540.200 Checkered plate
05540.700 Trench cover
05550.000 Stair treads & nosings
05550.700 Stair treads
05560.000 Metal castings
05560.200 Construction castings
05580.000 Formed metal fabrications
05580.150 Alloy steel chain
05580.600 Lamp posts
05580.900 Window guards
05650.000 RAILROAD TRACK&ACCESSORSS
05655.000 Railroad trackwork
05655.700 Railroad
05655.750 Railroad track
05700.000 ORNAMENTAL METAL
05720.000 Ornamental railings
05720.700 Railings, ornamental
05800.000 EXPANSION CONTROL
05810.000 Exp joint cover assembls
05810.350 Expansn joint assemblies
06000.000 WOOD & PLASTICS
06050.000 BAS WD / PLS MTRL / MTHDS
06055.000 Wood & plastic laminate
06055.720 Convector covers
06055.740 Counter top
06055.780 Tops
06073.000 Fire retardant treatment
06073.400 Lumber treatment
06073.600 Plywood treatment
06090.000 Wood & plastic fastenings
06090.600 Nails
06090.650 Nails
06090.700 Sheet metal screws
06090.750 Wood screws
06090.800 Timber connectors
06090.850 Bracing
06100.000 ROUGH CARPENTRY
06110.000 Wood framing
06110.100 Blocking
06110.150 Bracing
06110.200 Bridging
06110.505 Framing, beams & girders
06110.510 Framing, ceilings
06110.515 Framing, columns
06110.520 Framing, heavy
06110.530 Framing, joists
06110.535 Framing, light structure
06110.545 Framing, miscellaneous
06110.550 Partitions
06110.555 Framing, roofs
06110.560 Framing, sills
06110.565 Framing, sleepers
06110.570 Framing,soffits&canopies
06110.575 Framing, treated lumber
06110.590 Framing, walls
06110.600 Furring
06110.700 Grounds
06120.000 Structural panels
06120.200 Minrl fiber cement panels
06120.800 Str sk plywd roof panels
06150.000 Wood decking
06150.600 Roof decks
06160.750 Sheathing
06160.800 Sheathing
06160.850 Subfloor
06160.900 Underlayment
06170.000 Prefabricated struct wood
06170.550 Laminated roof deck
06170.600 Structural joists
06170.980 Roof trusses
06180.400 Glued-lamintd constrtion
06200.000 FINISH CARPENTRY
06220.000 Millwork
06220.200 Moldings, base
06220.400 Moldings, casings
06220.450 Moldings, ceilings
06220.500 Moldings, exterior
06220.700 Moldings, trim
06220.800 Moldings, window and door
06220.900 Soffits
06250.000 Prefinished paneling
06250.200 Paneling, hardboard
06250.500 Paneling, plywood
06260.000 Board paneling
06260.400 Paneling, boards
06270.000 Clst/tlty wood shelving
06270.200 Shelving
06400.000 ARCHITECTURAL WOODWORK
06410.000 Custom cabinets
06410.100 Cabinets
06410.210 Casework, frames
06410.220 Cabinet doors
06410.230 Cabinet hardware
06410.240 Drawers
06410.400 Vanities
06430.000 Stairs & railings
06430.500 Railing
06430.505 Deck,wood,prss trtd lumbr
06430.620 Stairs, prefabricated
06430.630 Stair parts
06440.000 Wood ornaments
06440.150 Beams, decorative
06440.350 Grilles
06440.400 Louvers
06440.500 Fireplace mantels
06440.550 Fireplace mantel beams
06440.700 Columns
06445.000 Simulated wood ornaments
06445.100 Millw,high densty polymer
06470.000 Screen, blinds & shutters
06470.100 Shutters, exterior
06500.000 STRUCTURAL PLASTICS
06510.000 Strt plastc shapes&plates
06510.400 Castings, fiberglass
06520.000 Plastic struct assemblies
06520.100 Stair tread, fiberglass
06600.000 PLASTIC FABRICATIONS
06610.300 Fiberglass
06620.000 Non-structural plastics
06620.200 Floor grating, fiberglass
06620.600 Netting, flexible plastic
06620.810 Solid surface countertops
06620.850 Vanity tops
07000.000 THERMAL&MOISTUR PROTECTNN
07100.000 DAMPPRFNG&WATERPROOFING
07110.000 Dampproofing
07110.100 Bitumins asphalt coating
07110.200 Cement parging
07130.000 Sheet waterproofing
07130.200 Elastomeric waterproofing
07130.500 Membrane waterproofing
07160.000 Cementits waterproofing
07160.150 Cementits waterproofing
07170.000 Bentonite waterproofing
07170.700 Bentonite
07190.000 Water repellents
07190.700 Rubber coating
07200.000 THERMAL PROTECTION
07210.000 Building insulation
07210.150 Blown-in insulation
07210.400 Insulation fasteners
07210.500 Poured insulation
07210.550 Masonry insulation
07210.600 Perimeter insulation
07210.700 Reflective insulation
07210.800 Sprayed
07210.900 Wall insulation, rigid
07210.950 Wall clng insl, non-rigid
07220.000 Roof & deck insulation
07220.700 Roof deck insulation
07240.000 Ext insulatn/fnsh systems
07240.100 Extrr inslt finish system
07260.000 Vapor retarders
07260.100 Building paper
07300.000 SHNG,ROOF TILS&ROOF CVRNG
07310.000 Shingles
07310.050 Aluminum
07310.100 Asphalt shingles
07310.500 Fiber cement
07310.800 Slate
07310.900 Steel
07310.980 Wood

07320.000 Roof tiles
07320.100 Aluminum
07320.200 Clay tile
07320.300 Concrete tile
07400.000 ROOFING & SIDING PANELS
07410.000 Metal roof & wall panels
07410.100 Aluminum roofing
07410.500 Mansard
07410.690 Metal facing panels
07410.700 Steel roofing
07420.000 Plastic roof&wall panels
07420.770 Fiberglass
07440.000 Faced panels
07440.200 Exposed aggregate panels
07460.000 Siding
07460.100 Aluminum siding
07460.300 Fascia
07460.500 Fiber cement siding
07460.600 Vinyl siding
07460.750 Soffit
07460.800 Steel siding
07460.900 Wood siding, boards
07460.950 Wood product siding
07500.000 MEMBRANE ROOFING
07510.000 Built-up bitumins roofing
07510.050 Asphalt
07510.300 Built-up roofing
07510.400 Cants
07510.700 Felt
07520.000 Cold appld bitmns roofing
07520.200 Cold applied
07530.000 Elstmrc membrane roofing
07530.350 Elastomeric roofing
07530.800 Single-ply membrane
07550.000 Modifd bit membrn roofing
07550.500 Modified bitumen roofing
07580.000 Roll roofing
07580.200 Roll roofing
07590.000 Roof maintenance&repairs
07590.300 Roof coatings
07600.000 FLASHING & SHEET METAL
07610.000 Sheet metal roofing
07610.300 Copper roofing
07610.500 Lead roofing
07610.700 Stainless steel roofing
07610.900 Zinc
07650.000 Flexible flashing
07650.600 Flashing
07700.000 ROOF SPECIALTS&ACCESSORSS
07710.000 Manufctrd roof specialts
07710.400 Downspouts
07710.450 Drip edge
07710.500 Elbows
07710.550 Gravel stop
07710.650 Gutters
07710.700 Gutter guard
07710.750 Reglet
07710.800 Expansion joint
07720.000 Roof accessories
07720.480 Pitch pockets
07720.500 Roof vents
07720.550 Ridge vent
07720.700 Roof hatches
07720.800 Walkway
07720.860 Smoke vent
07720.870 Vents, one-way
07800.000 FIRE & SMOKE PROTECTION
07812.000 Cementitious fireproofing
07812.600 Sprayed
07840.000 Firestopping
07840.100 Firestopping
07900.000 JOINT SEALERS
07920.800 Joint sealants
08000.000 DOORS & WINDOWS
08100.000 METAL DOORS & FRAMES
08110.000 Steel doors & frames
08110.200 Commercial steel doors
08110.250 Door frames
08110.300 Fire door
08110.600 Residential steel door
08110.820 Steel frames, knock down
08160.000 Sldng metal doors&grilles
08160.300 Steel, sliding
08200.000 WOOD & PLASTIC DOORS
08210.000 Wood doors
08210.450 Kalamein
08210.720 Pre-hung doors
08210.850 Tin clad
08210.900 Wood door, architectural
08210.910 Wood doors, decorator
08210.920 Wood doors, paneled
08210.930 Wood doors, residential
08210.950 Wood fire doors
08210.960 Wood frames
08260.000 Sldng wood&plastic doors
08260.700 Glass, sliding
08280.000 Wd/plstc strm/scrn doors
08280.800 Storm doors & frames
08300.000 SPECIALTY DOORS
08310.000 Access doors & panels
08310.100 Access doors
08310.150 Bulkhead cellar doors
08310.300 Floor, commercial
08310.350 Floor, industrial
08320.000 Detention doors & frames
08320.950 Vault front
08330.000 Coiling doors & grilles
08330.130 Counter doors
08330.640 Coiling grille
08330.700 Rolling grille supports
08330.720 Rolling service doors
08330.740 Roll up grille
08341.000 Cold storage doors
08341.200 Cold storage
08343.000 Hangar doors
08343.400 Hangar door
08344.000 Industrial doors
08344.120 Air curtains
08344.200 Double acting, swing
08344.300 Glass door, swing
08344.350 Kennel doors
08344.600 Shock absorbing doors
08344.645 Swing doors alum entrance
08344.650 Tubular steel swing doors
08348.000 Sound control doors
08348.100 Acoustical doors
08360.000 Overhead doors
08360.550 Overhead, commercial
08360.600 Residential garage doors
08360.800 Telescoping steel doors
08370.000 Vertical lift doors
08370.950 Vertical lift doors
08380.000 Traffic doors
08380.480 Flxbl trnsp strip entranc
08400.000 ENTRANCES & STOREFRONTS
08411.000 Aluminm framed storefront
08411.100 Aluminum frames
08411.120 Aluminum doors
08411.140 Aluminum doors & frames
08411.600 Stainless steel and glass
08411.650 Storefront systems
08460.000 Automatic entrance doors
08460.600 Sliding entrance
08460.650 Sliding panels
08470.000 Revolving entrance doors
08470.600 Revolving doors
08480.000 Balanced entrance doors
08480.150 Balanced doors
08500.000 WINDOWS
08510.000 Steel windows
08510.700 Screens
08510.750 Steel sash
08510.770 Steel windows
08520.000 Aluminum windows
08520.100 Aluminum sash
08520.120 Aluminum windows
08520.500 Jalousies
08550.100 Wood windows
08550.150 Bow-bay window
08550.200 Casement window
08550.250 Double hung
08550.650 Palladian windows
08550.670 Picture window
08550.680 Wood windows
08550.750 Sliding window
08550.800 Window grille or muntin
08550.820 Wood sash
08550.840 Wood screens
08580.000 Special function windows
08580.900 Storm windows
08600.000 SKYLIGHTS
08620.000 Unit skylights
08620.400 Prefabricated
08620.800 Skylight
08700.000 HARDWARE
08710.000 Door hardware
08710.100 Automtc openers commercle
08710.120 Automtc openers industrle
08710.150 Average
08710.200 Bolts, flush
08710.220 Bumper plates
08710.300 Door closer
08710.320 Deadlocks
08710.340 Doorstops
08710.400 Entrance locks
08710.450 Floor checks
08710.500 Hasp
08710.520 Hinges
08710.550 Kick plate
08710.650 Lockset
08710.700 Mortise lockset
08710.750 Panic device
08710.780 Push-pull plate
08710.800 Special hinges
08720.000 Weatherstripping & seals
08720.100 Astragals
08720.300 Weatherstripping
08720.800 Threshold
08770.000 Door/window accessories
08770.100 Area wall
08770.200 Door protection
08800.000 GLAZING
08810.000 Glass
08810.100 Acoustical glass units

08810.160 Beveled glass
08810.250 Faceted
08810.260 Float glass
08810.270 Full vision
08810.300 Glazing variables
08810.460 Insulating glass
08810.500 Laminated glass
08810.600 Obscure glass
08810.650 Patterned glass
08810.675 Reflective glass
08810.740 Sandblasted glass
08810.760 Sheet glass
08810.780 Spandrel glass
08810.850 Window glass
08810.900 Wire glass
08830.000 Mirrors
08830.100 Mirrors
08840.000 Plastic glazing
08840.600 Plexiglass acrylic
08840.650 Polycarbonate
08840.900 Vinyl glass
08900.000 GLAZED CURTAIN WALL
08911.000 Glazed alumnm curtn wall
08911.200 Curtain walls
08911.700 Tube framing
08911.900 Window walls
08950.000 Trnslcn wall/rf assemblss
08950.100 Skyroofs
09000.000 FINISHES
09100.000 METAL SUPPORT ASSEMBLIES
09110.000 Non-load brng wall framng
09110.100 Metal studs, partitions
09130.000 Acoustical suspension
09130.100 Ceiling suspensn systems
09200.000 PLASTER & GYPSUM BOARD
09205.000 Furring & lathing
09205.530 Furring
09205.540 Gypsum lath
09205.560 Metal lath
09205.700 Accessories, plaster
09210.000 Gypsum plaster
09210.100 Gypsum plaster
09210.200 Gauging plaster
09210.300 Keenes cement
09210.500 Perlite vermicult plaster
09210.600 Plaster, gypsum
09210.650 Plaster partition wall
09210.900 Thin coat
09220.000 Portland cement plaster
09220.200 Stucco
09250.000 Gypsum board
09250.200 Cementitious backerboard
09250.300 Blueboard
09250.500 Ceilings
09250.600 Tpn/ jnts thin coat plstr
09250.700 Drywall
09250.800 High abuse gypsum board
09260.000 Gypsum board systems
09260.100 Partition wall
09260.800 Shaft wall
09270.000 Drywall accessories
09270.100 Accessories, drywall
09300.000 TILE
09310.000 Ceramic tile
09310.100 Ceramic tile
09310.300 Ceramic tile panels
09330.000 Quarry tile
09330.100 Quarry tile
09350.000 Glass mosaics
09350.100 Glass mosaics
09370.000 Metal tile
09370.100 Metal tile
09400.000 TERRAZZO
09420.000 Precast terrazzo
09420.900 Terrazzo, precast
09450.000 Cast-in-place terrazzo
09450.100 Terrazzo, cast in place
09450.200 Tile or terrazzo base
09500.000 CEILINGS
09510.000 Acoustical ceilings
09510.700 Suspnd acstc ceilng tiles
09510.760 Suspend ceilings,complete
09510.900 Ceiling tile
09600.000 FLOORING
09631.000 Brick flooring
09631.100 Flooring
09635.000 Marble flooring
09635.100 Marble
09637.000 Stone flooring
09637.100 Slate tile
09643.000 Wood block flooring
09643.100 Wood block flooring
09644.000 Wood comp. flooring
09644.100 Wood composition
09648.000 Wood strip flooring
09648.100 Wood
09651.000 Resilient base & access.
09651.100 Stair treads and risers
09658.000 Resilient tile flooring
09658.100 Resilient flooring
09673.000 Composition flooring
09673.100 Composition flooring
09680.000 Carpet
09680.800 Carpet
09680.900 Carpet tile
09680.910 Carpet maintenance
09700.000 WALL FINISHES
09720.000 Wall covering
09720.100 Wall covering
09770.000 Special wall surfaces
09770.400 Fibrgls reinforcd plastic
09770.700 Raised panel system
09770.750 Sltwll panels and accssrs
09800.000 ACOUSTICAL TREATMENT
09820.000 Acoustical insul/sealants
09820.500 Sound attenuation
09830.000 Acoustical barriers
09830.100 Barriers
09840.000 Acoustical wall treatment
09840.100 Sound absorbing panels
09900.000 PAINTS & COATINGS
09910.000 Paints & coatings
09910.100 Cabinets and casework
09910.200 Painting
09910.300 Doors and windws,exterior
09910.310 Doors&windws,interr latex
09910.320 Dr an wnd,int alk (l bas)
09910.400 Fences
09910.500 Floors, interior
09910.620 Miscellaneous, exterior
09910.630 Miscellaneous, interior
09910.700 Siding exterior
09910.710 Siding, misc.
09910.800 Trim, exterior
09910.910 Walls,masnry (cmu),exterr
09910.920 Walls and ceilings
09930.000 Stains/transp. finishes
09930.100 Varnish
09963.200 Glazed coatings
09990.000 Paint restoration
09990.800 Sanding
09990.900 Surface preprtn,exterior
09990.910 Surface preprtn,interior
10000.000 SPECIALTIES
10100.000 VISUAL DISPLAY BOARDS
10110.000 Chalkboards
10110.240 Chalkboards
10120.000 Tack & visual aid boards
10120.350 Control boards
10120.940 Bulletin board
10150.000 COMPARTMENTS & CUBICLES
10155.000 Toilet compartments
10155.100 Partitions, toilet
10185.000 Shwr/drss compartments
10185.100 Partitions, shower
10190.000 Cubicles
10190.200 Partitions, hospital
10200.000 LOUVERS & VENTS
10210.000 Wall louvers
10210.800 Louvers
10260.000 WALL & CORNER GUARDS
10265.000 Wall & corner guards
10265.200 Corner guards
10265.250 Corner protection
10265.500 Wallguard
10270.000 ACCESS FLOORING
10275.000 Access flooring
10275.150 Pedestal access floors
10300.000 FIREPLACES & STOVES
10305.000 Manufactured fireplaces
10305.100 Fireplace, prefabricated
10310.000 Fireplc speclts&accessors
10310.100 Fireplace accessories
10320.000 Stoves
10320.100 Woodburning stoves
10340.000 MANFCTR EXTERR SPECIALTS
10342.000 Cupolas
10342.100 Cupola
10350.000 FLAGPOLES
10355.000 Flagpoles
10355.400 Flagpole
10355.900 Flagpole
10400.000 IDENTIFICATION DEVICES
10410.000 Directories
10410.100 Directory boards
10430.200 Exterior signage
10450.000 PEDESTRN CONTROL DEVICES
10455.000 Turnstiles
10455.900 Turnstiles
10500.000 LOCKERS
10505.000 Metal lockers
10505.500 Lockers
10520.000 FIRE PROTECTN SPECIALTIES
10525.000 Fire prot. specialties
10525.200 Fire equipment cabinets
10525.300 Fire extinguishers
10530.000 PROTECTIVE COVERS
10535.000 Awning & canopies
10535.200 Canopies
10550.000 POSTAL SPECIALTIES
10555.000 Mail delivery systems
10555.600 Mail boxes
10555.700 Mail chutes
10600.000 PARTITIONS

10605.000 Wire mesh partitions
10605.100 Partitions, woven wire
10610.000 Folding gates
10610.100 Security gates
10615.000 Demountable partitions
10615.100 Partitions,movable office
10630.000 Port prtns/scrns/pn
10630.100 Partitions, portable
10651.000 Accordn folding partitnss
10651.100 Parttns,folding accordion
10653.000 Folding panel partitions
10653.200 Partitions, folding leaf
10658.000 Acoustic air wall
10658.100 Partitions, operable
10670.000 STORAGE SHELVING
10674.000 Storage shelving
10674.500 Shelving
10674.600 Parts bins
10750.000 TELEPHONE SPECIALTIES
10755.000 Telephone enclosures
10755.400 Telephone enclosure
10800.000 TLT/BTH/LNDRY ACCESSORIES
10820.000 Bath accessories
10820.100 Bath accessories
10820.400 Medicine cabinets
10880.000 SCALES
10885.000 Scales
10885.100 Scales
10900.000 WARDROBE&CLOSET SPECIALTS
10905.500 Coat racks/wardrobes
11000.000 EQUIPMENT
11010.000 MAINTENANCE EQUIPMENT
11013.000 Flr/wll cleanng equipment
11013.800 Vacuum cleaning
11020.000 SECURITY&VAULT EQUIPMENT
11021.000 Safes
11021.600 Safe
11030.000 TELLER&SERVICE EQUIPMENT
11038.000 Bank equipment
11038.150 Bank equipment
11040.000 ECCLESIASTICAL EQUIPMENT
11041.000 Ecclesiastical equipment
11041.250 Church equipment
11050.000 LIBRARY EQUIPMENT
11051.000 Library equipment
11051.400 Library equipment
11060.000 THEATER & STAGE EQUIPMENT
11063.000 Stage equipment
11063.600 Stage equipment
11100.000 MERCANTILE EQUIPMENT
11102.000 Barber shop equipment
11102.150 Barber equipment
11103.000 Cash register/checking
11103.200 Checkout counter
11104.000 Display cases & systems
11104.700 Refrigerated food cases
11110.000 COMM LNDR&DRY CLNN EQPMNT
11119.000 Laundry cleaning
11119.450 Laundry equipment
11130.000 AUDIO-VISUAL EQUIPMENT
11136.000 Projection screens
11136.500 Projection screens
11136.600 Movie equipment
11140.000 VEHICLE SERVICE EQUIPMENT
11141.000 Service station equipment
11141.150 Automotive
11150.000 PARKING CONTROL EQUIPMENT
11156.000 Parking equipment
11156.600 Parking equipment
11160.000 LOADING DOCK EQUIPMENT
11161.000 Loading dock equipment
11161.200 Dock bumpers
11161.400 Loading dock
11170.000 SOLID WASTE HNDLNG EQPMNT
11179.000 Waste handling equipment
11179.150 Waste handling
11190.000 DETENTION EQUIPMENT
11191.000 Detention equipment
11191.150 Detention equipment
11300.000 FLD WAST TRTM&DSPS EQPMNT
11310.000 Sewage & sludge pumps
11310.350 Pumps, pneumatic ejector
11310.700 Sewage pumping stations
11390.000 Pkg sewage treat plants
11390.900 Wastwtr treatment system
11400.000 FOOD SERVICE EQUIPMENT
11405.000 Food storage equipment
11405.800 Wine cellar
11410.000 Food prep equipment
11410.150 Commrcl kitchen equipment
11420.550 Kitchen ventilation
11450.000 RESIDENTIAL EQUIPMENT
11454.000 Residential appliances
11454.500 Residential appliances
11454.550 Disappearing stairway
11470.000 DARKROOM EQUIPMENT
11471.000 Darkroom processing
11471.700 Darkroom equipment
11472.000 Revolving darkroom doors
11472.370 Darkroom doors
11480.000 ATHLT RCRTN&THRPTC EQPMNT
11483.000 Bowling alleys
11483.150 Bowling alleys
11484.000 Exercise equipment
11484.400 Health club equipment
11486.000 Gymnasium equipment
11486.700 School equipment
11488.000 Shooting ranges
11488.700 Shooting range
11500.000 INDSTRL&PROCESS EQUIPMENT
11520.000 Industrial equipment
11520.250 Dust collection systems
11520.300 Equipment installation
11520.850 Vocational shop equipment
11600.000 LABORATORY EQUIPMENT
11620.000 Laboratory equipment
11620.350 Laboratory equipment
11700.000 MEDICAL EQUIPMENT
11710.000 Medical equipment
11710.500 Medical equipment
11740.000 Dental equipment
11740.200 Dental equipment
12000.000 FURNISHINGS
12050.000 FABRICS
12051.000 Fabrics
12051.350 Draperies
12300.000 MANUFACTURED CASEWORK
12310.000 Metal casework
12310.100 Key cabinets
12310.200 Display cases
12310.560 Ironing center
12310.750 Casework
12400.000 FURNISHINGS & ACCESSORIES
12460.000 Furnishing accessories
12460.900 Ash/trash receivers
12483.000 Floor mats & frames
12483.200 Floor mats
12492.000 Blinds and shades
12492.100 Blinds, interior
12492.600 Shades
12493.000 Curtains and drapes
12493.200 Drapery hardware
12500.000 FURNITURE
12510.000 Office furniture
12510.600 Office case goods
12510.675 Posts
12520.000 Seating
12520.550 Seating
12540.000 Hospitality furniture
12540.100 Tables, folding
12540.500 Furniture, hotel
12540.700 Furniture, restaurant
12560.000 Institutional furniture
12560.200 Furniture, school
12560.300 Furniture, dormitory
12560.400 Furniture, hospital
12560.700 Furniture, library
12600.000 MULTIPLE SEATING
12640.150 Booths & tables
12800.000 INTERIOR PLANTS&PLANTERS
12830.000 Interior planters
12830.600 Planters
13000.000 SPECIAL CONSTRUCTION
13010.000 AIR SUPPORTED STRUCTURES
13011.000 Air supported structures
13011.100 Air supp strg tank covers
13011.200 Air supported structures
13030.000 SPECIAL PURPOSE ROOMS
13035.000 Special purpose rooms
13035.100 Integrated ceilings
13035.150 Anechoic chambers
13035.180 Audiometric rooms
13035.200 Clean rooms
13035.300 Darkrooms
13035.500 Music
13035.700 Refrigeration
13035.800 Sauna
13035.900 Sport court
13035.940 Steam bath
13080.000 SOUND,VBRTN&SSMC CONTROL
13081.000 Sound control
13081.100 Acoustical
13090.000 RADIATION PROTECTION
13091.000 X-ray/rad freq protection
13091.600 Shielding lead
13091.700 Shielding,radio frequency
13100.000 LIGHTNING PROTECTION
13101.055 Lightning protection
13110.000 CATHODIC PROTECTION
13111.050 Cathodic protection
13120.000 PRE-ENGINEERED STRUCTURES
13128.000 Pre-eng. structures
13128.060 Portable booths
13128.070 Control towers
13128.160 Tension structures
13128.200 Comfort stations
13128.300 Domes
13128.340 Geodesic dome
13128.360 Garage costs
13128.380 Garden house
13128.500 Grandstands
13128.540 Greenhouse
13128.580 Hangars

13128.600 Kiosks
13128.700 Pre-engnrd steel buildngs
13128.800 Shelters
13128.840 Silos
13128.880 Swimming pool enclosure
13150.000 SWIMMING POOLS
13151.000 Swimming pools
13151.200 Swimming pools
13151.700 Swimming pool equipment
13175.000 ICE RINKS
13176.000 Ice rinks
13176.500 Ice skating
13200.000 STORAGE TANKS
13201.000 Storage tanks
13201.200 Elevated storage tanks
13201.300 Ground tanks
13201.800 Underground storage tanks
13280.000 HAZARDS MATERL REMEDIATN
13281.000 Hazards materl remediatn
13281.120 Bulk asbestos removal
13281.125 Asbests abatmnt work area
13281.130 Demltn asbsts cntmnt area
13281.135 Asbests abatmnt equipment
13281.140 Dcntm cntnmn area demoltn
13281.145 Osha testing
13281.150 Encapsltn with sealants
13281.155 Wast pckgn,hndln,& dispsl
13281.440 Removal
13281.460 Lead paint encapsulation
13600.000 SOLR AND WIND ENRG EQPMNT
13630.000 Solar collctr components
13630.200 Solar energy
13700.000 SECRTY ACCESS AND SRVLLNC
13710.000 Security access
13710.300 Access control
13800.000 BUILDING AUTOMATN&CONTROL
13832.200 Cntrl cmpnt / ddc systems
13836.000 Pneumatic controls
13836.200 Control systems,pneumatic
13838.200 Control components
13850.000 DETECTION & ALARM
13851.000 Detection & alarm
13851.050 Clocks
13851.055 Clock systems
13851.065 Detection systems
13851.350 Tank leak detectn systems
13900.000 FIRE SUPPRESSION
13910.000 Basic fire prtctn mtl/mth
13910.400 Fire hose and equipment
13910.800 Fire valves
13920.000 Fire pumps
13920.400 Fire pumps
13930.000 Wet-pipe fire supp sprnkl
13930.400 Sprnklr system components
13960.000 Co2 fire extinguishing
13960.200 Atmtc fire supprs systems
14000.000 CONVEYING SYSTEMS
14100.000 DUMBWAITERS
14110.000 Manual dumbwaiters
14110.400 Dumbwaiters
14120.000 Electric dumbwaiters
14120.400 Dumbwaiters
14200.000 ELEVATORS
14210.000 Electrc tractn elevators
14210.100 Elevators or lifts
14210.200 Elevators
14300.000 ESCALATORS & MOVING WALKS
14320.000 Escalators
14320.300 Escalators
14360.000 Moving walks
14360.500 Moving ramps and walks
14400.000 LIFTS
14460.000 Corrspndn& parcel lifts
14460.200 Correspondence lift
14460.600 Parcel lift
14500.000 MATERIAL HANDLING
14510.000 Material handling
14510.900 Motorized car
14550.000 Conveyors
14550.350 Material handling
14550.900 Vertical conveyor
14560.000 Chutes
14560.250 Chutes
14580.000 Pneumatic tube systems
14580.800 Pneumatic tube system
14600.000 HOISTS & CRANES
14610.000 Fixed hoists
14610.500 Material handling
14630.000 Bridge cranes
14630.300 Crane rail
14630.700 Overhead bridge cranes
15000.000 MECHANICAL
15050.000 BASIC MATERIALS & METHODS
15055.000 Selective mech demolition
15055.300 Hvac demolition
15055.600 Plumbing demolition
15060.300 Pipe hangers and supports
15070.800 Vibration absorbers
15075.400 Pipng systm idntfc labels
15082.000 Duct insulation
15082.200 Insulation
15100.000 BUILDING SERVICES PIPING
15106.000 Glass pipe & fittings
15106.120 Pipe, glass
15106.160 Pipe, glass, fittings
15107.000 Metal pipe & fittings
15107.220 Pipe, brass
15107.260 Pipe, brass, fittings
15107.320 Pipe, cast iron
15107.360 Pipe, cast iron, fittings
15107.380 Pipe,cast irn/st,fittings
15107.420 Pipe, copper
15107.460 Pipe, copper, fittings
15107.480 Pp/t,grvd-jnt for copper
15107.500 Pipe, corrosion resistant
15107.560 Pipe,corrs resstn,fittngs
15107.620 Pipe, steel
15107.640 Pipe, steel, fittings
15107.660 Pipe, steel, fittings
15107.690 Pip,grv-jnt stl fit&valvs
15107.920 Pipe, stainless steel
15107.960 Pipe,stnlss steel,fittngs
15108.000 Plastic pipe & fittings
15108.520 Pipe, plastic
15108.560 Pipe, plastic, fittings
15108.590 Pip,hgh dns ply pls (hdp)
15110.000 Valves
15110.100 Valves, brass
15110.160 Valves, bronze
15110.200 Valves, iron body
15110.300 Vlvs,lind,corr rst/ purty
15110.400 Multipurpose valves
15110.500 Valves, plastic
15110.600 Valves, semi-steel
15110.700 Valves, steel
15110.800 Valves, stainless steel
15120.000 Piping specialties
15120.120 Air control
15120.140 Air purging scoop
15120.160 Automatic air vent
15120.180 Circuit sensor
15120.200 Circuit setter
15120.220 Cocks,drains&specialties
15120.250 Dielectric unions
15120.280 Expansion couplings
15120.300 Expansion joints
15120.320 Expansion tanks
15120.350 Flexible connectors
15120.370 Flexible metal hose
15120.400 Float valves
15120.420 Flow check control
15120.520 Hydrn htng contrl valves
15120.550 Liquid drainers
15120.580 Mixing valve
15120.610 Monoflow tee fitting
15120.640 Pressure reducing valve
15120.670 Pressure regulator
15120.700 Pressr&tmprtr safety plug
15120.730 Sleeves and escutcheons
15120.760 Steam trap
15120.790 Strainers, basket type
15120.820 Strainers, y type
15120.840 Strainers, y type
15120.870 Suction diffusers
15120.900 Thermoflo indicator
15120.920 Venturi flow
15120.940 Water supply meters
15120.960 Weld end ball joints
15120.980 Zone valves
15140.000 Domestic water piping
15140.100 Backflow preventer
15140.600 Vacuum breakers
15140.700 Vacuum breakers
15140.800 Wtr ham arrs / shck absrb
15155.000 Drainage specialties
15155.160 Cleanouts
15155.170 Cleanout tee
15155.300 Drains
15155.340 Floor receptors
15155.400 Interceptors
15155.680 Separators
15155.740 Sink waste treatment
15155.780 Traps
15155.940 Vent flashing
15180.000 Heatng and cooling piping
15180.100 Anti-freeze
15180.200 Pumps, circulating
15180.300 Pumps,cndns return system
15180.700 Refrigeration specialties
15180.800 Steam condensate meter
15195.000 Fuel systems
15195.490 Fuel oil specialties
15195.605 Meters
15200.000 PROCESS PIPING
15210.100 Compressors
15210.200 Compressor accessories
15210.900 Vacuum pumps
15220.100 Laboratory equipment
15230.000 Industrial process pipe
15230.500 Pumps, general utility
15230.600 Pumps miscellaneous
15400.000 PLUMBNG FIXTURS&EQUIPMENT
15410.000 Plumbing fixtures
15410.200 Carriers/supports

15410.300 Faucets/fittings
15410.800 Toilet seats
15410.900 Washer dryer accessories
15411.000 Commercl/ndst fixtures
15411.400 Hot water dispensers
15411.500 Hydrants
15411.700 Urinals
15411.800 Wash center
15411.840 Wash fountains
15411.900 Water chillers remote
15412.000 Drinking fountains
15412.200 Drinking fountain
15413.000 Electric water coolers
15413.900 Water cooler
15414.000 Emergency fixtures
15414.200 Industrl safety fixtures
15417.700 Prison/insttn fixtures
15418.000 Res/cmm/ndstr fixtures
15418.100 Baths
15418.200 Bidet
15418.400 Laundry sinks
15418.450 Lavatories
15418.500 Showers
15418.600 Sinks
15418.900 Water closets
15440.000 Plumbing pumps
15440.240 Pumps,prssr boostr system
15440.400 Pumps, grinder system
15440.800 Pumps, sewage ejector
15440.900 Pumps, pedestal sump
15440.940 Pumps, submersible
15450.900 Water heater storag tanks
15460.000 Domstc water cond eqpmntt
15460.900 Water softener
15470.400 Water filters
15480.000 Domestic water heaters
15480.200 Water heaters
15480.700 Temperatr maintennc cable
15480.900 Heat transfer packages
15480.940 Water heatr pckgd systems
15500.000 HEAT GENERATION EQUIPMENT
15510.000 Heatng boilrs and accssrs
15510.110 Boiler blowdown systems
15510.120 Burners
15510.300 Boilers, electric, asme
15510.400 Boilers, gas fired
15510.460 Boilers, gas/oil
15510.500 Boilers, oil fired
15510.700 Blrs,packgd scotch marine
15510.760 Boilers, solid fuel
15510.880 Swimming pool heaters
15520.050 Shot chemical feeder
15530.000 Furnaces
15530.200 Furnac cmpnnt and combntn
15530.400 Furnaces
15530.440 Furnacs,combinatn systems
15540.000 Fuel-fired heaters
15540.300 Duct furnaces
15540.900 Space heaters
15550.000 Breechngs,chimneys&stacks
15550.200 Draft controls
15550.440 Vent chimney
15550.600 Induced draft fans
15600.000 REFRIGERATION EQUIPMENT
15620.000 Packaged water chillers
15620.100 Absorption water chillers
15620.600 Cntrfgl/r water chillers
15640.000 Packaged cooling towers
15640.400 Cooling towers
15660.000 Liquid clrs/vp condensers
15660.100 Condensers
15670.000 Refrig condensing units
15670.300 Condensing units
15680.300 Evaporators
15700.000 HTNG/V/ CONDTNG EQUIPMENT
15705.000 Curbs/pads/stands prefab
15705.600 Curbs/pads prefabricated
15710.000 Heat exchangers
15710.900 Heat exchangers
15720.000 Air handling units
15720.100 Air handling unit
15720.200 Cntr statn air-hndln unit
15720.300 Evaporative coolers
15720.500 Make-up air unit
15730.000 Unitary air condtng equip
15730.200 Computer room units
15730.500 Packgd termnl air condtnr
15730.600 Roof top air conditioners
15730.800 Window unit air conditnrs
15730.840 Self-cntnd single package
15730.900 Split ductless system
15740.000 Heat pumps
15740.100 Heat pumps
15750.000 Humidty control equipment
15750.300 Dehumidifiers
15750.500 Humidifiers
15761.000 Air coils
15761.200 Duct heaters
15761.700 Coils, flanged
15765.000 Fan coil unit/nt ventltrs
15765.200 Fan coil air conditioning
15765.600 Heating&ventilating units
15766.000 Fin tube radiation
15766.190 Hydronic heating
15768.000 Infrared heaters
15768.600 Infra-red unit
15770.000 Floor-htng&snow-mltng eq.
15770.200 Electric heating
15770.500 Radiant floor heating
15780.000 Energy recovery equipment
15780.100 Heat recovery packages
15800.000 AIR DISTRIBUTION
15810.000 Ducts
15810.600 Ductwork
15820.000 Duct accessories
15820.300 Duct accessories
15830.000 Fans
15830.100 Fans
15850.000 Air outlets & inlets
15850.300 Diffusers
15850.500 Grilles
15850.600 Louvers
15850.700 Registers
15854.000 Ventilators
15854.300 Ventilators
15860.000 Air cleaning devices
15860.100 Air filters
15860.500 Exhaust systems
15900.000 HVAC INSTRMNTN&CONTROLS
15905.000 Hvac instrumentation
15905.960 Water level controls
15950.000 TSTNG/DJSTNG/BS
15955.000 Hvac test/adjust/balance
15955.100 Balancing, air
15955.700 Piping, testing
15955.900 Balancing, water
16000.000 ELECTRICAL
16050.000 BASIC ELCTR MTRLS&METHODS
16055.000 Selective demolition
16055.300 Electrical demolition
16060.000 Grounding & bonding
16060.800 Grounding
16070.320 Hangers
16100.000 WIRING METHODS
16120.000 Conductors & cables
16120.120 Armored cable
16120.210 Cable connectors
16120.220 Cable splicing
16120.230 Cable terminations
16120.240 Cable terminations
16120.280 Control cable
16120.400 Fiber optics
16120.500 Mineral insulated cable
16120.550 Non-metallc sheathd cable
16120.600 Portable cord
16120.700 Shielded cable
16120.750 Special wires & fittings
16120.755 Modlr flxbl wiring system
16120.800 Undercarpet
16120.900 Wire
16131.000 Cable trays
16131.105 Cable tray ladder type
16131.110 Cable tray solid bottom
16131.120 Cable tray trough
16131.130 Cabl tray,cvrs and divdrs
16132.000 Conduit & tubing
16132.205 Conduit
16132.210 Conduit
16132.220 Conduit nipples
16132.230 Conduit in concrete slab
16132.240 Conduit in trench
16132.250 Cnd fit for rgd glv steel
16132.260 Cutting and drilling
16132.300 Elctr nnmtll tubing (ent)
16132.320 Flexible metallic conduit
16133.000 Multi-outlet assemblies
16133.540 Trench duct
16133.560 Underfloor duct
16133.580 Wiring duct
16133.800 Surface raceway
16134.000 Wireway & aux gutters
16134.150 Wireway
16136.000 Boxes
16136.600 Outlet boxes
16136.620 Outlet boxes, plastic
16136.700 Pull boxes & cabinets
16136.720 Pull boxes & cabinets
16139.000 Residential wiring
16139.700 Residential wiring
16140.000 Wiring devices
16140.500 Low voltage switching
16140.910 Wiring devices
16150.000 Wiring connections
16150.275 Motor connections
16200.000 ELECTRICAL POWER
16210.000 Elect utility services
16210.600 Meter centers and sockets
16220.000 Motors & generators
16220.600 Handling
16220.610 Motors
16220.900 Vrbl frqn drv/ frqn drivs
16230.000 Generator assemblies
16230.450 Generator set
16260.800 Untrr power supp/ trnsfrm

16270.000 Transformers
16270.100 Buck-boost transformer
16270.200 Dry type transformer
16270.300 Isolating panels
16270.310 Isolating transformer
16270.600 Oil filled transformer
16270.610 Transformer,liquid-filled
16270.620 Transformer handling
16280.000 Power filters&conditnrss
16280.100 Automtc voltage regultrsr
16280.300 Capacitors
16280.340 Computr isolatn trnsfrmr
16280.360 Computr regultr trnsfrmr
16280.600 Power conditnr transformr
16280.820 Transnt supprs/ regulator
16280.840 Trnsn voltg suppr trnsfrm
16290.000 Power measure & control
16290.800 Switchboard instruments
16290.860 Voltage monitor systems
16300.000 TRANSMISSION&DISTRIBUTION
16310.600 Line poles & fixtures
16310.610 Line towers & fixtures
16310.700 Ovrhd line cndctr&devices
16310.850 Transmssn line right way
16330.760 Switchgear
16360.800 Substation equipment
16400.000 LOW-VOLTAGE DISTRIBUTION
16410.000 Encl swtchs&circt breakrs
16410.200 Circuit breakers
16410.800 Safety switches
16410.840 Time switches
16415.100 Non-autmtc trnsfr switchs
16415.600 Automtc transfer switches
16420.000 Enclosed controllers
16420.200 Contactors, ac
16420.220 Control stations
16420.240 Control switches
16420.800 Relays
16440.000 Swbds,panels&cont centers
16440.500 Load centers
16440.620 Motor cntrl centr compnts
16440.640 Motor control center
16440.660 Motor starters & controls
16440.700 Pnlb&load cntr crct brkrs
16440.720 Panelboards
16440.800 Switchboards
16440.820 Switchboards
16440.840 Switchboards
16440.860 Switchboards
16450.000 Enclosed bus assemblies
16450.100 Aluminum bus duct
16450.200 Bus duct
16450.300 Copper bus duct
16450.320 Copper bus duct
16450.360 Copp almn bus duct fittng
16450.500 Feedrail
16490.000 Low v dist cmpnts/ccsrs
16490.300 Fuses
16500.000 LIGHTING
16510.000 Interior luminaires
16510.300 Fixture hangers
16510.430 Interior hid fixtures i
16510.440 Interr lighting fixtures
16510.800 Residential fixtures
16520.000 Exterior luminaires
16520.300 Exterior fixtures
16525.100 Airport lighting
16530.000 Emergency lighting
16530.320 Exit and emrgncy lighting
16550.820 Track lighting
16580.200 Enrgy savng lghtn devices
16580.300 Fixture whips
16585.000 Lamps
16585.600 Lamps
16700.000 COMMUNICATIONS
16720.000 Tel and intrcmm equipment
16720.300 Doctors in-out register
16720.600 Nurse call systems
16800.000 SOUND & VIDEO
16820.000 Sound reinforcement
16820.300 Doorbell system
16820.800 Public address system
16820.840 Sound system
16850.000 Television equipment
16850.600 T.v. systems

CESS Resources: CESS NPS Assemblies

CESS NPS Assemblies—Uniformat 1998 Specification (Modified)

Legend	Uniformat level	CESS	Example	
	Level 1	Group Assembly	**B**	*****

F	**********SPECIAL CONSTRUCTION**********	
F20	***SELECTIVE BUILDING DEMOLITION***	
F2020	***HAZARDOUS COMPONENTS ABATEMENT***	
F2020-005	Railroad, Boiler Asbestos Abatement	Sf
F2020-010	Railroad, Piping Asbestos Abatement	Lf
F2020-020	Railroad, Lead Paint Abatement, Grit Blasting, Includes PP Equip.	Sf
G	**********BUILDING SITEWORK**********	
G20	***SITE IMPROVEMENTS***	
G2000	***CAMPGROUND ASSEMBLIES***	
G2000-001	Campground, Walk- In Campsite Pad-New	Sf
G2000-001-1	Campground, Edging, Campsite Pad	Site
G2000-002	Campground, Drive-In Campsite Pad and Parking Spur-New	Sf
G2000-010	Campground, Picnic Tables	Each
G2000-012	Campground, Trash and Recycling Containers	Each
G2000-013	Campground, Food Lockers	Each
G2000-015	Campground, Site Marker Post	Each
G2000-020	Campground, Fireplace - Round Stone Masonry with Adjustable Grill	
G2000-025	Campground, Fireplace - Square Stone Masonry 4' x 6'	Ea
G2000-030	Campground, Fireplace - 32 Fire Ring w/Adjust. Grate	0
G2000-035	Campground, Pedestal Grill	Ea
G2000-040	Campground, Lantern Hangers	
G2000-045	Campground, Wheel Stops - Concrete	Ea
G2000-046	Campground, Wheel Stops - Timber	Ea
G2000-050	Campground, Vegetation Clearing and Replanting	Acre
G2000-060	Campground, Yard Hydrant	Ea
G2000-070	Campground,Elect. Campsite Pedstal, w/100' Service from Existing Panel	Ea
G2010	***CONCRETE PAVEMENT***	
G2010-005	Concrete Walkway	Sf
G2010-010	Curbing: Asphalt, Concrete, and Stone (Granite)	Lf
G2020	***FEE STATION ASSEMBLIES***	
G2020-100	Fee Station Assembly - New and Complete	
G2030	***TRAILS ASSEMBLIES***	
G2030-010	Trail Signage, Wood construction, Posts, Sign, and Sign Prep.	Each
G2030-020	Trail, Steps, Timber	Ea
G2030-021	Trail, Steps, Stone	Ea
G2030-100	Trail- Existing, Brush Clearing	Lf
G2030-105	Trail- New, Brush Clearing	
G2030-200	Trail- New, Stabilized Crushed Stone	Mi
G2030-205-1	Trail- New, Asphalt Paved, IDEAL CONDITIONS	Mi
G2030-205-2	Trail- New, Asphalt Paved, AVERAGE CONDITIONS	Mi
G2030-205-3	Trail- New, Asphalt Paved, ADVERSE CONDITIONS	Mi
G2030-207	Trail- Existing, Prepare and Seal Asphalt Surface	Mi
G2030-210	Trail-New, Concrete Paved Trail/Walkway	Mi
G2030-211	Trail- New, Unpaved Natural Surface, BY HAND	Lf
G2030-212	Trail- New, Unpaved Natural Surface, WITH MECHANIZED EQUIPMENT	Lf
G2030-213	Trail- Existing, Repair by SLOPE CUT, Unpaved Natural Surface, BY HAND	Lf
G2030-215	Trail- Existing, Repair Tread Surface by HAND,Unpaved Natural Surface	Cy
G2030-216	Trail- Existing, Repair Tread Surface MACHINE,Unpaved Natural Surface	Cy
G2030-500	Trail, ADD Switchback to Unpaved Trail	Ea
G2030-800	Trail- Existing, ADD GEOGRID to Trail	Sf
G2030-900	Trail, Backcountry Stock Team	Anml
G2031	***TRAILS WATER DIVERSION STRUCTURES***	
G2031-010	Trail, Water Bar - Rubber	Ea
G2031-011	Trail, Water Bar - Timber	
G2031-012	Trail, Water Bar - Stone	
G2031-013	Trail, Water Bar - Swale	
G2031-030	Trail, Culverts - PVC, Corrugated Metal Pipe	Lf
G2031-100	Trail, Stepping Stones over Shallow Water Crossing	Sf
G2040	***RETAINING WALLS***	
G2040-005	Stone Retaining Wall	Sf
G2040-010	Boulder Veneer Retaining Wall, Rip-Rap Against Bank, Machine Placed	Sf
G2040-015	Timber Retaining Wall	Sf
G2040-020	Concrete Retaining Wall, Gravity Type	Lf
G2040-025	Masonry Interlocking Block Retaining Wall	Sf
G2040-030	Gabion Retaining Wall	Sy
G2041	***BOARDWALKS AND RAILINGS***	
G2041-003	Boardwalk, Typical on Grade	Sf
G2041-005	Boardwalk, Typical Elevated	Sf
G2041-010	Boardwalk, Transition Ramps, Typical	Sf
G2041-020	Boardwalk, Repair Decking	

G2041-035	Boardwalk, Viewing Platforms, Typical with Handrail	Sf
G2041-040	ADD Bench to Boardwalk	Lf
G2042	***FENCING AND HANDRAIL***	
G2043	***EXTERIOR SIGNAGE***	
G2044	***FOOT BRIDGES AND UNDERPASSES***	
G2044-005	Foot Bridge, Glue Laminated Construction, Installed	sf
G2050	***EXTERIOR MISC. METAL STRUCTURE REPAIR AND REFURBISH***	
G2050-005	Prep&Paint Misc Steel, Surfaces, Plating, Rail, Ladder, Pipe, Louvers	sf
G30	***SITE CIVIL/MECHANICAL UTILITIES***	
G3010	***WATER SUPPLY***	
G3010-100	Piping, Water Service From Main, Ductile Iron	Lf
G3010-200	Piping, Water Service From Main, Copper	Lf
G3020	***SANITARY SEWER***	
G3020-100	Manhole or Catch Basin, 4' ID	ea
G3020-200	Piping, Drainage and Sewage, Polyvinyl Chloride	Lf
G3020-300	Piping, Drainage and Sewage, Concrete	Lf
G3030	***STORM SEWER***	
G3030-100	Manhole or Catch Basin, 4' ID	ea
G3030-200	Piping, Drainage and Sewage, Concrete	Lf
G3030-300	Piping, Storm Drainage, Corrugated Metal	Lf
G3060	***FUEL DISTRIBUTION***	
G3060-100	Piping, Gas Service, Polyethylene	Lf
G3090	***DUMPSTATION ASSEMBLIES***	
G3090-100	Dumpstation - Campground, New and Complete	ea
G3090-105	Dumpstation - Campground, Replace Water Tower	
G4000	***SITE ELECTRICAL DISTRIBUTION***	
G4000-005	Electrical Distribution - Campground Fee Station	ft
R	**********RAILROAD ASSETS**********	
R10	***SELF PROPELLED ROLLING STOCK***	
R1010	***STEAM POWERED STOCK***	
R1010-005	Railroad, Replace Pipe Insulation	Lf
R1010-010	Railroad, Replace Pipe Insulation Jacket	Lf
R1010-015	Railroad, Replace Sightglass, Liquid Indicator	ea
R1010-020	Railroad, Replace ID Tags, Brass	ea
R1010-025	Railroad, Replace Gauges, Pressure or Vacuum	ea
R1010-030	Railroad, Replace Valves, Brass, Gas cock, Threaded	ea
R1010-035	Railroad, Replace Valves, Bronze, Angle, Rising Stem, Threaded, 150#	ea
R1010-040	Railroad, Replace Valves, Bronze, Ball, Threaded, 150#	ea
R1010-045	Railroad, Replace Valves, Bronze, Butterfly, SS Disc & Stem, 175#	ea
R1010-050	Railroad, Replace Valves, Bronze, Check swing, Threaded, 150#	ea
R1010-055	Railroad, Replace Valves, Bronze, Check swing, Soldered, 300#	ea
R1010-060	Railroad, Replace Valves, Bronze, Gate, NRS, Soldered, 125#	ea
R1010-065	Railroad, Replace Valves, Bronze, Gate, NRS, Threaded, 150#	ea
R1010-070	Railroad, Replace Valves, Bronze, Gate, NRS, Flanged, 150#	ea
R1010-075	Railroad, Replace Valves, Bronze, Gate, Rising Stem, Soldered, 300#	ea
R1010-080	Railroad, Replace Valves, Bronze, Gate, Rising Stem, Threaded, 150#	ea
R1010-085	Railroad, Replace Valves, Bronze, Globe, Rising Stem, Threaded, 150#	ea
R1010-090	Railroad, Replace Valves, Bronze, Relief, Press & Temp, ASME, Threaded	ea
R1010-095	Railroad, Replace Valves, Bronze, Relief, Press, Poppet, Threaded	ea
R1010-100	Railroad, Replace Valves, Bronze, Relief, Press, Water, ASME, Threaded	ea
R1010-105	Railroad, Replace Valves, Bronze, Press Red, 300 to 25-75 psi	ea
R1010-110	Railroad, Replace Valves, Bronze, Press Red, High Cap 250 to 25-75 psi	ea
R1010-115	Railroad, Replace Valves, Bronze, Silent Check, Comp Wfr, 125/150#	ea
R1010-120	Railroad, Replace Valves, Bronze, Silent Check, Full Wfr, 150#	ea
R1010-125	Railroad, Replace Valves, Bronze, Silent Check, Globe, 150#	ea
R1010-130	Railroad, Replace Valves, Bronze, Silent Check, Screwed End, 250#	ea
R1010-135	Railroad, Replace Valves, Bronze, Tempering, Water, Soldered	ea
R1010-140	Railroad, Replace Valves, Bronze, Tempering, Water, Threaded	ea
R1020	***DIESEL POWERED STOCK***	
R1030	***ELECTRIC POWERED STOCK***	
R20	***TOWED ROLLING STOCK***	
R2010	***PASSENGER CARS***	
R2010-005	Railroad, Relocate Rolling Stock	ea
R2010-010	Railroad, Rust Abatement, Grit Blasting, Sealing	sf
R2010-020	Railroad, Prep & Painting, Metal Surface, Urethane up to 3 coats	sf
R2010-100	Railroad, Miscellaneous Disassembly and Reassembly	hr
R2020	***FREIGHT CARS***	
R30	***NON-ROLLING STOCK RAILROAD ASSETS***	
R3010	***TRACK***	

CESS to FMSS Data Relationships

CESS TO FMSS DATA RELATIONSHIPS

The following CESS estimate data is transferred to the FMSS Work Order in the following manner:

CESS Element	FMSS Element	Comment
Estimate file name	Location # and Work Order #	
Item	Operation Description	
Takeoff Quantity	Material Quantity	
Labor Unit price	Labor Rate	Includes distributed factors
Labor Amount	Labor Line Cost	Includes distributed factors
Labor Hours	Labor Hours	
Crew Resource ID	Labor Code	
Crew Resource Description	Labor Description	
Material Unit price	Material	Includes distributed factors
Material Amount	Material Line Cost	Includes distributed factors
Subcontractor Unit price	Labor Rate	Treated as Labor; Includes distributed factors
Subcontractor Amount	Labor Line Cost	Treated as Labor; Includes distributed factors
Equipment Unit price	Tool Rate	Includes distributed factors
Equipment Amount	Tool Line Cost	Includes distributed factors
Equipment Hours	Tool Hours	
Crew Resource ID	Tool Code	
Crew Resource Description	Tool Description	
Other Unit price	Labor Rate	Treated as Labor; Includes distributed factors
Other Amount	Labor Line Cost	Treated as Labor; Includes distributed factors
Park Location Factor		Distributed throughout Unit prices
Historic Preservation Factor		Distributed throughout Unit prices
Design Contingency		Distributed throughout Unit prices
General Conditions	Service Amount	Combined into a single Service Amount
Overhead and Profit	Service Amount	Combined into a single Service Amount

CESS Actions Reflected in FMSS

CESS ACTIONS REFLECTED IN FMSS

When you perform an action in FMSS, CESS reacts as follows:

FMSS Action	CESS response	Comments
Click the 'CESS Estimate' button	Creates new estimate or opens existing estimate	
Click the 'Revise Estimate' button	Creates revision to an existing estimate	Stores separate copy of the original estimate
Change the Deficiency Work Order status to 'CAN' (Cancel)	Deletes the estimate	
Change the Deficiency Work Order status to 'CLOSE'	Removes and archives the estimate	Archived estimates are stored in a separate folder
Change the Deficiency Work Order status to 'COSTED'	No change in CESS	
Change the Deficiency Work Order status to 'APPR'	No change in CESS	
Change the Deficiency Work Order status to 'INPRG '	No change in CESS	
Change the Deficiency Work Order status to 'COMPLETE'	No change in CESS	

Units of Measure

UNITS OF MEASURE

Unit	Unit Description
#	Number, Number Of, Pounds
A	Ampere, Acre
Ac	Acre, Air Conditioning
acre	Acre
Ah	Ampere-Hour
amp	Ampere
amph	Ampere-Hour
awg	American Wire Gage
bag	Bag
bbl	Barrel
bcy	Bank Cubic Yards
Bf	Board Feet
Bg	Bag
bhp	Brake Horsepower, Boiler Horsepower
Bl	Bale
blk	Block
blks	Blocks
box	Box
brk	Brick
brks	Bricks
btu	British Thermal Unit
btuh	BTU per Hour
Bx	Box
C	Hundred
car	Car
ccf	Hundred Cubic Feet
Cd	Crew Day
Cf	Cubic Feet
cfm	Cubic Feet per Minute
Ch	Crew Hour
Ci	Cubic Inch
Clf	Hundred Linear Feet
Cm	Crew Month
csf	Hundred Square Feet
Ct	Count
ctn	Carton
cuft	Cubic Foot
cuyd	Cubic Yard
Cw	Crew Week
cwt	Centiweight (100 lb)
Cy	Cubic Yards
Da	Day
day	Day
door	Door
Dr	Door
drum	Drum
Dy	Day
Ea	Each
Each	Each
Ei	Equivalent Inches
face	Face
fl	Floor, Fluid
floz	Fluid Ounces
flr	Floor
flue	Flue

Unit	Unit Description
fpm	Feet per Minute
ft	Foot, Feet
ftlb	Foot-Pound
fxtr	Fixture
ga	Gage
gal	Gallon
gl	Gallon
gpd	Gallons per Day
gph	Gallons per Hour
gpm	Gallons per Minute
head	Head
hood	Hood
hour	Hour
hp	Horsepower
hr	Hour
in	Inch
inch	Inch
jack	Jack
job	Job
jug	Jug
kip	Kip (1000 lb force)
kv	kilovolt
kva	kilovolt-Ampere
kw	kilowatt
kwh	kilowatt-Hour
lane	Lane
lb	Pound
lbhr	Pounds per Hour
lbs	Pounds
leaf	Leaf
lf	Lineal Foot, Lineal Feet
li	Lineal Inch
ln	Lane
ls	Lump Sum
m	Thousand
ma	Milliampere
mbf	Thousand Board Feet
mcf	Thousand Cubic Feet
mcfm	Thousand Cubic Feet per Minute
md	Man Day
men	Men
mgd	Million Gallons per Day
mh	Man-Hour
mi	Mile
mile	Mile
mlf	Thousand Lineal Feet
mm	Man Month
mnth	Month
mo	Month
move	Move
msf	Thousand Square Feet
mw	Man Week
mwt	megawatt
name	Name
nose	Nose
opng	Opening
pail	Pail
pair	Pair
pc	Piece

Unit	Unit Description
pkg	Package
pl	Pail
plan	Plan
pool	Pool
pr	Pair
prsn	Person
psf	Pounds per Square Foot
psi	Pounds per Square Inch
psig	Pounds per Square Inch Gage
qt	Quart
risr	Riser
rl	Roll
roll	Roll
roof	Roof
room	Room
rs	Riser
rsr	Riser
sctn	Section
seat	Seat
set	Set
sf	Square Feet
sfca	Square Foot Contact Area
sgnl	Signal
sht	Sheet
si	Square Inch
spkr	Speaker
sq	Square (100 SF)
stop	Stop
surf	Surface
sy	Square Yard
syst	System
tb	Tube
tf	Track Foot
tn	Ton
tn/d	Ton per Day
tns	Tons
ton	Ton
Trd	Tread
Trk	Truck
Tube	Tube
Vent	Vent
vf	Vertical Foot, Vertical Feet
vlf	Vertical Linear Feet
w	Watt
wall	Wall
week	Week
wk	Week
yr	Year

NPS Glossary:
General Terminology

NPS-GLOSSARY
General Terminology

Accountability: The obligations to report, explain, or justify to primary stakeholders. (AMP/FMSS Student Manual, 01/02)

Add-ons: Assumptive conditions that drive costs for cost estimated projects. In the NPS, there are five different factors that must be considered when developing a cost estimate for a particular project. These factors must be added on to the estimate to ensure that an estimate is as accurate as possible.

Alterations: Changes to the interior arrangements or other physical characteristics of an existing facility or installed equipment so that it can be used more effectively for its currently designated purpose or adapted to a new use. Alterations may include work referred to as improvement, conversion, remodeling, and modernization but are not maintenance. (Committing to the Cost of Ownership)

Annual Maintenance: Maintenance performed to repair failures during the year in which they occur. Includes preventive and/or cyclic maintenance performed in the year in which it is scheduled to occur. (DOI 2003 Budget Request Formulation Guidance Attachment G)

Annual Maintenance and Repair (M&R) Budget: An annual maintenance and repair budget will in general be the sum of two components:

- routine expenditures for maintenance, repairs and planned replacement and
- Expenditures for correction of deferred deficiencies (i.e., backlog reduction).

An M&R budget should not include operations or alterations expenditures. (Committing to the Cost of Ownership)

Annual Work Plan (AWP): A plan prepared on an annual basis prior to the start of the applicable fiscal year that systematically lays out the maintenance and repair work to be accomplished within the budget constraints of the area. (NASA Facilities Mgmt 10/94)

Appropriation: Authority by an act of Congress to make payments out of the Treasury for specified purposes. (NASA Facilities Mgmt 10/94)

- Annual Appropriation: An appropriation that is available for incurring obligations only during the one fiscal year specified in the appropriation Act.
- Current Appropriation: an appropriation that is available for obligation during the current fiscal year.

Appropriation Year: In the case of an annual appropriation, that fiscal year in which obligations were authorized to be incurred. (NASA Facilities Mgmt 10/94)

Assessment: The process of comparing and evaluating an entity against established standards, and documenting the differences. (ICAP Ver. 2.0 Reference Manual 1993)

Asset: Real or personal property which the NPS desires to track and manage as a distinct identifiable entity. It may be a physical structure or grouping of structures, land features, or other tangible property which has a specific service or function such as a farm, cemetery, campground, marina, or sewage treatment plant. The term "asset" shall also be applied to movable items such as vehicles and equipment. (ICAP Ver. 2.0 Reference Manual 1993), DO-80

Asset Deficiencies: A facility's defect that occurs when maintenance and repair tasks are not performed in a timely manner. Deficiencies may not have immediately observable physical consequences, but when allowed to accumulate uncorrected, they inevitably lead to deterioration of performance, loss of asset value, or both. An accumulation of such uncorrected deficiency is a backlog that represents a liability (in both physical and financial terms) for an asset. (DOI, FMAR 2/98)

Asset Management: A systematic process of maintaining, upgrading, and operating physical assets cost-effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized logical approach to decision-making, providing a framework for handling both short- and long-term planning. (*Asset Management: Advancing the State of the Art Into the 21st Century Through Public-Private Dialogue,* Society of State Highway and Transportation Officials, 1996.), DO-80

Asset Management Process: A process representing the primary steps required to properly maintain and account for assets utilizing best business practices; Mission, Needs Assessment, Inventory of Assets, Work Identification, Work Planning, Work Performance and Evaluation. (AMP/FMSS Student Manual 1/02)

Asset Priority Index (API): An asset evaluation process that quantifies the value of an asset in relation to the mission of the park. The API utilizes a numeric rating system whereby assets are ranked. (Facility Management Program 04/02), DO-80

Authorization: A separate Act that authorizes appropriations to be made. (NASA Facilities Mgmt 10/94)

Auto Number: These are unique identifiers that allow the software to keep records separate and organized. The FMSS is part of a national database and the numbers are assigned in the order that the information is received in Washington. Therefore, if you enter ten items, you can only be assured that they will be numbered in such a way that the first record will have an auto number that is smaller than each of the remaining nine records. They will not necessarily be in consecutive order.

Backlog: The unfunded facilities deficiencies work required to bring facilities and collateral equipment to a condition that meets accepted codes, laws, and standards to achieve expected life. (DOI, FMAR 2/98)

Backlog of Maintenance and Repair (BMAR): The unfunded facilities maintenance work required to bring facilities and collateral equipment to a condition that meets acceptable facilities maintenance standards. (NASA Facilities Mgmt 10/94)

Base Operations: Annual maintenance and operations paid for by normal NPS appropriations. Base included no special funding for regular cyclic, cultural cyclic, repair/rehab, line item construction, youth programs, etc.

Benchmark: The continuous process of measuring a product, service, or process against the best practices of recognized leaders in the field in order to achieve superior performance. (NASA Facilities Mgmt 10/94), DO-80

Benchmarking: A well-defined, widely accepted standard of performance that is used to measure an individual's progress toward a specific level of competency. (DO-80, draft 2004)

Budget: A formal estimate of future revenues, obligations to be incurred, and outlays to be made during a definite period of time and, when determined to be appropriate, upon the basis of accrued expenditures and costs to be incurred. (NASA Facilities Mgmt 10/94)

Budget Authority: The right, provided by law, to enter into obligations that will result in immediate or future outlays involving Government funds, except that such term does not include authority to ensure or guarantee the repayment of indebtedness incurred by another person or the Government. The basic forms of budget authority are appropriations, contract authority, and borrowing authority. Budget authority may be classified by the period of availability (1 year, multiple year, no year), by the timing of Congressional action (current or permanent), or by the manner of determining the amount available (definite or indefinite). (NASA Facilities Mgmt 10/94)

Budget Cycle: The period of time that elapses from the initiation of the budget process to the completion thereof for a particular fiscal year. (NASA Facilities Mgmt 10/94)

Budget Execution: The processes involved at every level in budgetary administration subsequent to passage of an appropriation act. This includes preparation of operating budgets, apportionments, funding actions, review and approval of operation budgets, fund reporting and report reviews. (NASA Facilities Mgmt 10/94)

Budget Formulation: The processes in preparation, review, and establishment of the annual budget presented to the Congress as a basis for appropriations. (NASA Facilities Mgmt 10/94)

Budget Guidelines: Both general and specific instructions furnished by a higher level of management as a basis for budget formulation and execution. (NASA Facilities Mgmt 10/94)

Budget Process: The process embracing all the stages through which the budget passes, namely, the formulation stage, the review and enactment stage, and the execution stage. (NASA Facilities Mgmt 10/94)

Budget Year: The fiscal year for which estimates are submitted, which is the period including Oct. 1 through the following Sept. 30 (see Fiscal Year). (NASA Facilities Mgmt 10/94)

Business Plan: A written document that clarifies park needs, identifying areas for improvement, and measuring current work against the standard that parks must maintain to fulfill their mission. (NPCA.org 2003)

Business Practices: Business Process-any series of steps that are followed in order to carry out some task in a business. (Managerial Accounting, 1997) DO-80, draft 2004

Call for Work: Work requested by other park divisions, cooperating associations, concessions, and other park-related interests.

Capital Asset Plan: Systematic approach to scheduling and budgeting current and anticipated deficiencies that maximizes the Return on Investment (ROI) and preserves the value of the physical asset. (Stewardship of Federal Facilities, 1998) DO-80, draft 2004

Capital Improvements (Alterations): Changes to the interior arrangements or other physical characteristics of an existing facility or installed equipment so that it can be used more effectively for its currently designated purpose or adapted to a new use. Alterations may include work referred to as improvement, conversion, remodeling, and modernization. Such alterations are not maintenance. (Committing to the Cost of Ownership) DO-80, draft 2004

Capital Improvements (New Construction): Construction that adds to the existing footprint of an asset, or creates a new asset. (AME, 2003), DO-80, draft 2004

Class A Estimates: This estimate is based on a complete and detailed quantity take-off from the construction drawings and specifications. The industry refers to Class A estimates as the *detailed, definitive construction of unit price* estimates. The purpose of this type of estimate is to

- Encourage the authorization of full funds
- Conduct a cost check of an authorized project
- Present a bid
- Enable a comparison with the contractor's bid
- Provide a control budget for construction

Class B Estimates: Industry refers to Class B estimates as *budgetary*, *assembly, or system* estimates. This type of estimate is used for:

- Budgeting or construction forecasting
- Authorization for full or partial funding

Class C Estimates: The construction industry refers to these estimates as *conceptual* or *order-of-magnitude* estimates. This type of estimate is generally used for the following projects:

- Feasibility studies
- Selection among alternative designs

- Development of project scope and program

Components: A building subsystem, major item of equipment, or of a major facility. (Instruction Memorandum No. C)-98-040, U.S. Department of Interior, Bureau of Land Management, 1998), DO-80, draft 2004

Component Renewal (CR): Also known as Recapitalization. The planned replacement of a component or system that will reach the end of its useful life based on condition and life cycle analysis within the facility's lifetime. Examples of component renewals include roof systems, utility components, pavement, and other major dynamic equipment. (AME, 2003), DO-80, draft 2004

Component Renewal Deferred Maintenance (CR-DM): A component renewal work type that has been tracked in the system and facility management practice~~,~~ and is not funded when identified as Deferred Maintenance will then move into the Component Renewal Deferred Maintenance work type category. *Note:* This allows for long-term business practices to be documented and reported. AME, 2003, DO-80, draft 2004

Condition Assessment: The inspection and documentation of the condition of the features of an asset as measured against the applicable maintenance or condition standards. It provides the basis for long-range maintenance planning as well as annual work plans and budgets. (ICAP Ver. 2.0 Reference Manual 1993), DO-80, draft 2004

> Condition Assessment, Annual (INCAA): The inspection of an asset identifying obvious and apparent deficiencies, documenting the condition as measured against the applicable maintenance or condition standards. It provides the basis for annual work plans and budgets. Develops verifiable deficiency cost estimates, determines the asset's Facility Condition Index for a simple measurement of a facility's relative condition at a particular point in time. Reviewing the API / FCI Relationship assists managers in determining appropriate action. The Annual Assessment identifies the deferred maintenance for a specific asset. (Facility Management Program 04/02), DO-80, draft 2004
>
> Condition Assessment, Comprehensive (INCAC): The review and validation of the inventory, inspection of an asset identifying in-depth deficiencies, documenting the condition as measured against the applicable maintenance or condition standards. It provides the basis for long–range maintenance planning as well as annual work plans and budgets. Develops verifiable deficiency cost estimates, determines the Facility Condition Index for a simple measurement of a facility's relative condition at a particular point in time. The Comprehensive Assessment identifies the deferred maintenance for a specific asset. The CA Comprehensive is to be performed on an asset every five (5) years. If conditions warrant or regulations require a CA, Comprehensive may occur more frequently. (Facility Management Program 04/02), DO-80, draft 2004

Condition Assessment Surveys (See also Facility Condition Assessment Survey): Periodic inspections of PP&E to determine their current condition and cost to correct any deficiencies. It

is desirable that condition assessment surveys be based on generally accepted methods and standards consistently applied. (Accounting for Property, Plant, and Equipment 11/30/97.)

Construction: The erection, installation, of a new or replacement facility, or an addition in area, volume, or both to an existing facility. (NASA Facilities Mgmt 10/94)

Construction Project: A facility project relating to the erection, installation, or assembly of a new facility, replacement facility, or an addition in area, volume, or both to an existing facility. (NASA Facilities Mgmt 10/94)

Contracting Officer: Any person who, by appointment in accordance with procedures prescribed by the Procurement Regulation (see appendix C. reference 36, Part 1, Subpart 4), has the authority to enter into and administer contracts and make determinations and findings with respect thereto, or has any part of such authority. (NASA Facilities Mgmt 10/94)

Contractor: The supplier of the end item and associated support items to the Government under the terms of a specific contract. (NASA Facilities Mgmt 10/94)

Contracts: All types of agreements and orders for the procurement of supplies or services. Includes awards and notices of award; contracts of a fixed price, cost, cost-plus-a-fixed-fee, or incentive type; contracts providing for the issuance of job orders, task orders, or task letters thereunder; letter contracts; and purchase orders. It also includes supplemental agreements with respect to any of the foregoing. (NASA Facilities Mgmt 10/94)

Corrective Action: This is the first step in the cost estimating process because it breaks down the best method for remediating a deficiency.

Corrective Action Priority: Once the corrective action has been determined, its priority level (critical, serious, minor) must be determined and recorded in the condition assessment work order.

Corrective Maintenance**:** Unscheduled reactive repairs that would not be estimated and planned, but accomplished by local staff or existing service contractors. *Note*: Not part of the condition assessment process, but a facility maintenance function relating to service calls. (AME, 2003), DO-80, draft 2004

Cost Estimate: An educated guess of what an item would cost to repair or replace. The estimate is based on previous experience with like assets in similar condition and/or developed using a cost estimating program. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Cost Estimating Software System (CESS) (Timberline™ Precision Estimating Tool): A software program used as a tool to assist in determining the cost of repairing identified asset deficiencies.

Cost of Ownership: Cost of ownership of a building is the total of all expenditures an owner will make over the course of the building's service lifetime. (Committing to the Cost of Ownership) Expenditures include Planning, Acquisition, Design, Construction, Operations & Maintenance, Recapitalization and Disposal. (DO-80, draft 2004)

Current Replacement Value (CRV): Standard industry costs and engineering estimates of materials, supplies and labor required to replace facility at existing size and functional capability. This cost includes current costs for planning / design, construction, and construction management. (DOI, FMAR 2/98), DO-80, draft 2004

Current Year: The fiscal year immediately preceding the budget year. (NASA Facilities Mgmt 10/94)

CSI Masterformat: This index is an industry standard that provides a breakdown of work or products installed in typical construction or facility repair projects. Also known as a "work breakdown structure" (WBS), knowledge of the CSI Masterformat can help NPS personnel in determining corrective actions and identifying cost estimate items.

Cyclic Maintenance: Work activities that recur on a periodic cycle of greater than 1 year. Typical projects include re-roofing or re-painting buildings, overhaul engines, and refinishing hardwood floors. (GAO Parks and Recreation Report, March 1988)

Deferred Maintenance: Maintenance that was not performed when it should have been or was scheduled to be and which, therefore, is put off or delayed. Continued deferment of maintenance will result in deficiencies. (DOI, FMAR 2/98)
In practice this means actions that are required to correct existing deficiencies that are a result of unaccomplished past maintenance, repairs and replacements. (AME, 2003)

Deficiencies: A facilities defect that occurs when maintenance and repair tasks are not performed in a timely manner. Deficiencies may not have immediately observable physical consequences, but when allowed to accumulate uncorrected, they inevitably lead to deterioration of performance, loss of asset value, or both. An accumulation of such uncorrected deficiency is a backlog that represents a liability (in both physical and financial terms) for a building. (DOI, FMAR 2/98)

Demolition**:** Removal of an asset that has been determined to be unsafe or no longer meets, or is not required to meet, mission goals. Removal of an NPS asset is determined by management in conjunction with the NPS planning and compliance procedures. (AME, 2003), DO-80, draft 2004

Design Contingency: These are automatically calculated at 20 percent by the CESS program to account for miscellaneous costs, change orders, and/or "things that go wrong."

Dimensions: This pane displays formula variables or 'questions' that assist in calculating quantities. Data only appears here if selected items are linked to formulas.

Electric Distribution**:** The delivery of electric energy to customers on the distribution system. Electric energy is carried at high voltages along transmission lines. It is reduced in voltage at a substation and delivered over primary distribution lines. For users needing even lower voltages, the voltage is reduced once again by a distribution transformer. At this point it changes from primary to secondary distribution voltage. (Condition Assessment Incident Command, Utility Terms 03/01)

Emergency Maintenance: A maintenance task carried out in order to avert an immediate hazard or to correct an unexpected failure (i.e. responding to a utility spill, rockslide, etc.). (AME, 2003), DO-80, draft 2004

Estimated Cost: A calculated anticipated amount, as distinguished from an actual outlay, based upon related cost experience, prevailing wages and prices, or anticipated future conditions, usually for the purposes of contract negotiation, budgetary control, or reimbursement. (NASA Facilities Mgmt 1/94)

Facility: A term used to encompass land, buildings, other structures, and other real property improvements, including utilities. (NASA Facilities Mgmt 10/94)

Facility Condition Assessment Survey (FCAS): See also Condition Assessment Surveys: This is used to establish the overall condition of an asset through the development of the asset's replacement cost and the calculation of the total deferred maintenance cost. This information is then used to develop the FCI for the asset. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Facility Condition Index (FCI): A measure of a facility's relative condition at a particular point in time to other similar facilities. The FCI rating is a ratio of the cost of repair of the assets deficiencies (deferred maintenance, recurring maintenance that has been deferred, component renewal that has been deferred and immediate personal hazard life safety repairs) divided by the current replacement value for the asset.

$$FCI = \frac{\text{FM sub-worktypes: DM + RM-DM + CR-DM + IPH}}{\text{CRV}}$$

The following ratings are baseline indicators that will be reviewed and adjusted by asset category as data is evaluated:

Good ≤ .100 - Assets in good condition are typically maintained with ONPS funds. Preventive Maintenance (cyclic) funds are used to maintain systems or features with a recurrence of more than one year to twenty-five years.

Fair = .101 – .150 - Assets in fair condition typically require Preventive Maintenance funds or other special emphasis funds to bring systems or features back to good condition. Repair Rehab funds may be used for more expensive/complex deferred maintenance items.

Poor = .151 – .500 - Assets in poor condition typically require Repair Rehab funds to bring them in to good condition. Line-Item funds may be used to reduce the more expensive/complex deferred maintenance items.

Serious = > .500 - Assets in serious condition: Heritage assets - Strongly consider stabilization / restoration. Non-heritage assets strongly consider replacement. (Facility Management Program 04/02), DO-80, draft 2004

Facility Management: The planning prioritizing, organizing, controlling, reporting, evaluation, and adjusting of facility use to support NPS activities based upon customer's facility needs and the Servicewide and Area's mission requirements. (NASA Facilities Mgmt 10/94), DO-80, draft 2004

Facility Management Program (FMP): The management systems and support computer software for planning, organizing, directing and controlling park maintenance. (ICAP Ver. 2.0 Reference Manual 1993)

Facility Management Software System (FMSS): This software meets all of the National Park Service criteria for a relational database to manage assets at the individual park level. (AMD/FMSS Student Manual 10/02), DO-80, draft 2004 FMSS (Maximo™) is an asset-based work identification, work management, and work analysis program. This “cradle to grave” asset and work management system allows a park, region or WASO to track all aspects of work related to a specific asset; such as planning and design, construction, operations/maintenance, and rehabilitation or removal.

Facility Maintenance: The day-to-day activities as well as the planned work required to preserve facilities (buildings, structures, grounds and utility systems) in such a condition that they may be used for their designated purpose over an intended service life. Facility maintenance includes all activities not included in facility operations and capital improvements. (NASA Facilities Mgmt 10//94)

Facility Operations: Work activities performed on a recurring basis throughout the year which intend to meet routine, daily park operational needs. Typical work performed under operations includes janitorial and custodial services, snow removal, operation or purchase of utilities (water, sewer, and electricity), grounds keeping, etc. (GAO Parks and Recreation report March 1988), DO-80, draft 2004

Facilities Work Controls/Evaluation: The analysis of planned versus accomplished work. Includes the review and updating of asset/feature condition, provides a review and refinement of the work process for future cycles. Implementation of this process includes integration of mission resources and organization with overall asset strategies. (DO-80, draft 2004)

Facilities Work Plan: The process of taking each individual work statement or qualified work request and developing the scope of work, estimating costs, determining the need for engineering or compliance approvals, determining the relationships with associated independent work orders, and determining funding, resources and priorities. (DO-80, draft 2004)

Fair (See also Facility Condition Index): A facility condition. Facility meets minimum standards, but requires additional maintenance to prevent further deterioration, increase operating

efficiency, and to achieve normal life expectancy. See Facility Condition Index. (DOI, FMAR 2/98)

Feature: A distinct element or separately identifiable part of an asset on which work is performed or which creates an identifiable workload. Examples of features include but are not limited to trees and landscaping; interior doors; roof surface/coverings; refrigerators; boilers; HVAC systems; etc. The NPS inventory is based on the identification and qualification of its assets and the features that make up each asset. The condition of an asset is reported in terms of the condition of its features. (ICAP Ver. 2.0 Reference Manual 1993) DO-80, draft 2004

Field Unit: A self-governing area under legal jurisdiction of the National Park Service, including but not limited to memorials; historic sites; parks; lakeshores; battlefields; preserves; etc.

Fire and Life Safety Annual: An annual fire and life safety inspection conducted by a trained person. This annual inspection will be as a follow up to the INFPCA it is not a substitute for it. These inspections shall be conducted in accord with the Annual Fire Protection Condition Assessment as set in RM-58. (DO-80, draft 2004)

Fire Protection Condition Assessment (INFPCA): A comprehensive fire and life inspection of a facility conducted by a Registered Fire Protection Engineer, Certified Fire Inspector, or other person approved by the Regional Structural Fire Management Officer. Each occupied building is required to be inspected initially and then again when there are any changes in the occupancy or changes to the building. All buildings that are critical to the operation of the park shall also be inspected. These inspections shall be conducted in accord with the Fire Protection Condition Assessment as set in RM-58. (DO-80, draft)

Fiscal Year: In the Federal Government, it is the 12-month period from Oct. 1 of one calendar year through Sept. 30 of the following year. (NASA Facilities Mgmt 10/94)

Funding: The issuance of allotments that provides authority to incur commitments and obligations and make payments within appropriations made by the congress, within the apportionment limitations established by the Office of Management and Budget, and within the approved resources authorization (NASA Facilities Mgmt 10/94)

Funding Availability: The amount of obligating authority provided by appropriations, contract authorizations, actual transfers to or from other appropriations, and anticipated reimbursements. (NASA Facilities Mgmt 10/94)

General Properties: Tangible assets that have an estimated useful life of two or more years, are not intended for sale in the ordinary course of business, and are intended to be used or available for use by the agency or bureau. (DO-80, draft 2004)

Gross Square Footage: The sum of floor areas within the outside faces of the exterior walls for all building levels which have floor surfaces. Covered walkways, open roofed-over areas that

are paved, porches and similar spaces shall have the architectural area multiplied by an area factor of 0.50.
{References include AIA D101, *Architectural Area and Volume of Buildings*; BOMA, *Standard Method for Measuring Floor Area in Office Buildings*, and IFMA's "Definitions" (web page)}.

Group Phase: A major section of the CESS cost data. These relate to the Level 1 and 2 CSI Masterformat sections.

Good (See also Facility Condition Index): A facility condition. Facility meets established maintenance standards, operates efficiently, and has a normal life expectancy. See Facility Condition Index. (DOI, FMAR 2/98)

GAO: Government Accountability Office.

Government-Furnished Equipment (GFE): Equipment in the possession of, or acquired directly by, the Government and subsequently delivered or otherwise made available to a contractor. A more detailed definition may be found in FAR, Part 45. (NASA Facilities Mgmt 10/94)

GPRA: Government Performance and Results Act of 1993.

Heritage Asset: Property, plant, and equipment (PP&E) that are unique because of historical significance, cultural importance, or significant architectural characteristics. (FASAB Report #6, 9/95), DO-80, draft 2004

Historic Designed Landscape : A landscape significant as a design or work of art; was consciously designed and laid out either by a master gardener, landscape architect, architect, or horticulturist to a design principle, or by an owner or other amateur according to a recognized style or tradition; has an historical association with a significant person, trend, or movement in landscape gardening or architecture; or a significant relationship to the theory or practice of landscape architecture. (The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Historic Landscapes, p.4-5).

Historic Vernacular Landscape: A landscape whose use, construction, or physical layout reflects endemic traditions, customs, beliefs, or values; in which the expression of cultural values, social behavior, and individual actions over time is manifested in physical features and materials and their relationships, including patterns of spatial organization, land use, circulation, vegetation, structures, and objects; in which the physical, biological, and cultural features reflect the customs and everyday lives of people. (The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Historic Landscapes, p.4-5)

Immediate Personal Hazard (IPH): A facility deficiency that poses a threat to human health and safety and requires immediate action. This work type is not intended as a code analysis. (DO-80, draft 2004)

Inspections: The documentation of the condition of the features of an asset as measured against applicable maintenance, condition, or other standards. (DO-80, draft 2004)

Inspection Guidance Document: These documents supplement the CA plans and give your park additional assistance when conducting assessments.

Inventory: The enumeration and identification of the assets and their functions that are to be managed and maintained by a park. The inventory is the foundation for effective facilities management. The inventory should permit identifying maintainable items including those subject to preventive maintenance. (ICAP Ver. 2.0 Reference Manual 1993), DO-80, draft 2004

ISO: International Standards Organization.

Inventory Condition Assessment Program (ICAP): A legacy computer software program no longer supported by the NPS.

Land: The solid part of the surface of the earth, excluding natural resources related to the land. (DO-80, draft 2004)

Legislatively Mandated: Deficiencies that must be corrected in response to regulatory requirements. Examples include Accessibility, EPA, lead-based paint, etc. These activities include retrofitting for code compliance and accessibility and removing hazardous materials, such as asbestos and underground storage tanks. (Stewardship of Federal Facilities), DO-80, draft 2004

Life Cycle Analysis Trade-off: An Alternatives Analysis used to consider the benefits of renovating, disposing, or replacing an existing asset. (DO-80, draft 2004)

Life Cycle Assessments: An analytical process for determining subsystem replacement needs based on expected design life and expert judgment. (DO-80, draft 2004)

Life Cycle Asset Management: A systematic process of maintaining, upgrading, and operating physical assets cost effectively. It combines engineering principles with sound business practices and economic theory, and it provides tools to facilitate a more organized, logical approach to decision-making. In the broadest sense, life-cycle asset management is a strategic approach to managing physical infrastructure.

Life Cycle Costing: An acquisition or procurement technique which considers operating, maintenance, and other costs in addition to the acquisition cost of assets. Since it results in a forecast of maintenance expenses, these forecasts may serve as a basis against which to compare actual maintenance expenses and estimate deferred maintenance. (Accounting for Property, Plant, and Equipment 11/30/97)

Life Cycle Costs (LCC): A form of economic analysis that considers the total cost of owning, operating, and maintaining a building over its useful life. Life-cycle costs are the sum of the present value of:

- Investment costs, less salvage values, at the end of the study period
- Nonfuel operation and maintenance costs;
- Replacement costs, less salvage costs, of replaced building systems; and
- Energy costs.

All life-cycle cost analysis of energy-related projects should be performed using the energy cost projections and discount rates provided by the National Institute of Standards and Technology in support of department of energy responsibilities under 10 CFR, part 436, Subpart A. (NASA Facilities Mgmt 10/94)

Life Cycle Planning: Means of budgeting for the cost of replacing subsystems based on their expected design life, or expected time of failure. (Creating a Defensible Recapitalisation Programme, 2002), DO-80, draft 2004

Line Item Construction (LI): Includes the reconstruction or replacement of park facilities, the preservation of historic and cultural resources, and the repair and reconstruction of park roads. In general, projects fitting this category are major projects that require more than 1 year to complete (GAO Parks and Recreation Report March 1988)

List of Classified Structures (LCS): A National Park Service list of important/historic structures/assets, which are nationally recognized.

Maintenance: See Facility Maintenance.

Maintenance Backlog: Park projects that have not been addressed due to lack of funding, limited staffing, and other factors.

Maintenance Standards: The expected condition or degree of usefulness of a facility or equipment item. A maintenance standard may be stated as both a required condition and a minimum acceptable condition beyond which the facility or equipment is deemed unsatisfactory. (NASA Facilities Mgmt 10/94)

Metrics: Meaningful measures. For a measure to be meaningful, it must present data that encompasses the right action. In the context of this handbook, metrics refers to management and performance measures. (NASA Facilities Mgmt 10/94)

Minor deficiency—CAP: Exists where: Standard preventive maintenance practices and conservation methods have not been followed; or there is a reduced life expectancy of affected or related materials and or systems; or there is a condition with long term impact beyond 5 years. (Condition Assessment Incident Command 03/01)

Needs Assessment: A process to determine that facilities are constructed, operated and maintained only when they provide the best protection or preservation of park resources; provide essential visitor services; support critical operations or functions in the park areas; or where absence of those facilities would substantially decrease the ability of the National Park

Service to meet its mission. (Instructor Manual: Facility Condition Assessment Survey, 2002), DO-80, draft 2004

OMB: Office of Management and Budget.

Operating Formulation System (OFS): A web-based system used to formulate all programs of the NPS budget, with the exceptions of land acquisition, construction planning, and line-item construction. OFS allows field managers and central office personnel to develop, maintain, and access a current and complete inventory of the program needs, while at the same time providing a basis for the annual budget formulation process. (Do-80, draft 2004)

Operating Plan: A budget plan, that when approved, is the basis for funding and financial control of obligations, costs, and disbursements.

Operations: See Facility Operations.

Past Year: The fiscal year that immediately precedes the current year. (NASA Facilities Mgmt 10/94)

PMIS: See Project Management Information System.

Poor (See also Facility Condition Index): A facility condition. Facility does not meet most maintenance standards and requires frequent repairs / rehabilitation to prevent more costly repairs, provide a minimal level of operating function, and to prevent significant loss of life expectancy. See Facility Condition Index. (DOI, FMAR 2/98)

Preventive Maintenance: Regularly scheduled periodic maintenance activities (within a year) on selected equipment, typically includes inspection, lubrication, and minor adjustment. (AME, 2003), DO-80, draft 2004

Program Year: A concept of accounting for funds, obligations, and outlays under a no-year appropriation by the identification of transactions in fiscal year segments identified by the fiscal year in which the individual items were obligated. (NASA Facilities Mgmt 10/94)

Project Management Information System (PMIS): The web-based program developed by the Perk Service to track program needs and deferred maintenance throughout the service.

Property, Plant and Equipment (PP&E): Consists of tangible assets, including land that meets the following criteria:

- They have estimated useful lives of 2 years or more;
- They are not intended for sale in the ordinary course of operations; and
- They have been acquired or constructed with the intention of being used, or being available for use by the entity. (Accounting for Property, Plant and Equipment 11/30/95)

Assets acquired through capital leases including leasehold improvements. Property owned by the reporting entity in the hands of others (e.g., state and local governments, colleges and universities, or Federal contractors); and lands rights. (Accounting for Property, Plant and Equipment 11/30/95), DO-80, draft 2004

Excludes items/assets: (1) held in anticipation of physical consumption such as operating materials and supplies and (2) the Federal entity has a reversionary interest in. (Accounting for Property, Plant and Equipment 11/30/95)

Real Property: Any interest in land and anything permanently attached to it, including structures, fixtures, and their improvements. (NASA Facilities Mgmt 10/94)

Recapitalization: The planned replacement of facility subsystems such as roofs, utilities, heating, ventilation, and air conditioning. (Creating a Defensible Recapitalization Program, 2002), DO-80, draft 2004

Recurring Maintenance (RM) (Cyclic in nature): Work activities that recur based on normal wear patterns on a periodic cycle of greater than 1 year and less than 10 years. Typical work includes painting, caulking, sealing, carpet replacements, etc. *Note:* A few RM activities may have cycles greater than 10 years, such as repointing of bricks. (DO-80, draft 2004)

Recurring Maintenance Deferred Maintenance (RMDM): Recurring maintenance that has been identified and tracked in the system and facility management practices, and is not funded when required will move into this work type category. *Note:* This allows for long-term business practices to be documented and reported. (AME), DO-80, draft 2004

Regional Directors Office (RDO): Office responsible for providing support and direction over the System Support Offices and Field units (Park Service Areas) assigned to them.

Repair: Work to restore damaged or worn-out property to a normal operating condition. Repairs are curative, while maintenance is preventative. (Committing to Cost of Ownership)

Repair Rehabilitation (RERE, R&R): Work activities (projects) designed to restore or extend the life of an asset. Examples include replacing sewer lines, repairing building foundations, and rehabilitating campgrounds and trails. (GAO Parks and Recreation Report March 1988)

Replacement: Exchange or substitution of one fixed asset for another with the capacity to perform the same function. (Committing to the Cost of Ownership)

Replacement Cost: See Current Replacement Value.

Scope of Work: A very thorough breakdown of the best method for remediating a deficiency. (Facility Condition Assessment Survey Student Manual, 2002), DO-80, draft 2004

Service Level: For a specific work activity, the annual rate or frequency of work performed. (MMP Computer User Manual)

Service Lifetime: The period of years over which the building provides shelter and an environment supportive of the activities it houses. (Committing to Cost of Ownership)

Shortfall: Difference between funds allocated and funds required to meet the Service/manufacturer's maintenance standards and applicable codes. (DOI, FMAR 2/98)

SMAC: Servicewide Maintenance Advisory Council.

Specifications: A document that stipulates methods, materials, performance, testing, limitations, or other criteria that must be adhered to during the construction of a facility. (NASA Facilities Mgmt 10/94)

Standard: Maintenance standards are defined as the expected condition or degree of usefulness of a facility or equipment item. A maintenance standard may be stated as both a required condition and a minimum acceptable condition beyond which the facility or equipment is deemed unsatisfactory. (NASA Facilities Mgmt 10/94)

Standard Industry Practices: Accepted published practices by peer organizations or associations.

Stewardship: The recognition and acceptance that the ownership of facilities requires the vision, resolve, experience, and expertise to ensure that resources are allocated effectively to sustain the investment. (AMP/FMSS Student Manual, 01/02)

Stewardship, Land: Includes land and land rights other than that acquired for or in connection with general PP&E. “Land” is defined as the solid part of the surface of the earth, excluding natural resources related to the land. (DO-80, draft 2004)

Subsystems: A major portion of a system that performs a specific function in the overall operational function of a system; a major functional subassembly or grouping of items or equipment that is essential to operational completeness of a system. (Cleland, D.I. & H. Kerzner. A Project Management Dictionary of Terms, 1998), DO-80, draft 2004

System Rules: Identify standardized requirements for how to operate and use the facility management software system. (AMP/FMSS Student Manual 10/02)

System Support Office (SSO)***:*** Offices that provide support of field units and are managed by regional offices.

Total Cost of Ownership: Includes conceptual planning, compliance planning, design, construction, maintenance and repair, rehabilitation/alternation, replacement, removal, and site restoration.

Total Life Cycle Cost Method: If used, the following information should be presented for each major class of PP&E.

- The original date of the maintenance forecast and an explanation for any changes to the forecast
- Prior year balance of the cumulative deferred maintenance amount

- The dollar amount of maintenance that was defined by the professionals who designed, built or managed the PP&E as required maintenance for the reporting period
- The dollar amount of maintenance actually performed during the period
- The difference between the forecast and actual maintenance, any adjustments to the scheduled amounts deemed necessary by the managers of the PP&E, and
- The ending cumulative balance for the reporting period for each major class of asset experiencing deferred maintenance. (Accounting for Property, Plant, and Equipment 11/30/97)

Uniformat II: Uniformat II is used for NPS assemblies in CESS.

Facility Management Software System Terminology

Assemblies – A collection of items needed to complete a particular unit of work. Assemblies allow multiple items to be taken off in a single operation and to obtain a cost per unit for a group of items. Work is combined by building systems (wall systems, foundation systems, HVAC systems, etc). Indexed by 12 divisions. (UNIFOMAT)

Asset Category - Identifies eight primary asset categories to track and report resource expenditures against (Site Area, Road, Trail, Grounds, Buildings, Utilities, Marine / Waterway, and Unique Assets). The categories are further defined by asset codes (example - Paved Road, Unpaved Road, Paved Parking Area, Unpaved Parking Area, Bridge and Tunnel). Please reference the specific asset category for a definition. (FMP 04/02)

Asset Code - Further detail of asset categories (example - Paved Road 1100, Unpaved Road 1200, Paved Parking Area 1300, Unpaved Parking Area 1350, Bridge 1700 and Tunnel 1800). (Facility Management Program 04/02)

Audit Report – Report from the FMSS system used to identify erroneous data entries and processes. (Condition Assessment Incident Command, Validation of Data 03/01)

Child Relationship - Assets and work-orders have a hierarchical relationship, with Child having a subordinate relationship to the Parent. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Citrix Server - An application server with Citrix Metaframe Server software. Citrix Metaframe extends the thin client, Windows Terminal Services operating system. Applications are published to Citrix. Users connect to the published application remotely and use the application within a Window on their desktop as if they were at the server. All computer resources to use the application are used at the server. The Citrix Server communicates with the users via the Citrix Independent Computing Architecture (ICA) and the Citrix Client software resident on their computer. The ICA communication uses minimal bandwidth (i.e., thin client). Also, Citrix ICA requires the equivalent of a 286 processor and minimum 640 KB of RAM to operate.

Condition Assessment Job Plan – An FMSS application that defines the standardize processes or steps involved to perform an inspection of the condition of an asset and its features for the purpose of generating Asset Deficiency Work Orders. (FCAS Student Manual 1/02)

Condition Assessment/Inspection Work Order – A work order created through the Preventive Maintenance application and attached to a specific asset, to initiate the condition assessment.

Condition Assessment Work Order – A work order created through the Preventative Maintenance module and lists the necessary steps and tasks to complete inspection of an asset and its features. This standardizes inspections throughout the NPS by creating a work order on which identified deficiencies can be reported against for each asset. (FCAS Student Manual 1/02)

Critical deficiency – There is advanced deterioration which has resulted in the failure of the feature or will result in the failure of the feature if not corrected within one year; or there is accelerated deterioration of adjacent or related materials as a result of the features deficiencies; or there is a threat to the health and or safety of the user; or there is a failure to meet a legislated requirement. (Condition Assessment Incident Command 03/01)

Data Import/Export – Periodic exchanges of data between one or more systems.

Data Integration – Changing data in one system affects data in all systems.

Data Linking – Viewing data in two or more systems for comparative purposes.

Data Migration – Moving data from one system to another on a one time basis, effectively making the first system redundant.

Deficiency Ratings – See Critical deficiency – FCAS, Serious Deficiency – FCAS, Minor deficiency – FCAS

Deficiency Work Order – A work order generated by the FMSS program, which documents deficiencies discovered while performing a condition assessment on an asset. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01) see Deferred Maintenance or Component Renewal

Equipment – A piece of rolling stock or a mechanical device used as part of an asset upon which work is performed. Examples include: a boat, a tractor, a generator, or an HVAC system. (AMP/FMSS Student Manual 1/02)

Excess – Asset Status – Asset does not meet the park's mission or is not required for operations (although it may be convenient to use.) Asset does not relate to a future desired condition in the park unit. Asset's removal is determined by the park's General Management Plan (GMP). (Managing Park Assets-API e-course 4/04)

Hierarchical Relationships – Classifies assets or work orders according to various criteria into successive levels or layers. The layers are titled “parent” or “child”. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Inactive – Asset Status – Asset is vacant and not being used for park mission or operations, and the asset's future use is not imminent. (Managing Park Assets-API e-course 4/04)

Job Plan - Describes operational steps, estimated labor, materials and tools needed to accomplish a specific task. (AMP/FMSS student manual 1/02)

Not Applicable – Asset Status – Asset is a Site or Area.

Operational – Asset Status – Asset is occupied and used in support of the park mission and operations, or asset is not operational but supports the park mission and operations as a "maintained asset." (Managing Park Assets-API e-course 4/04)

Operational / Obsolete - Asset Status – Asset that is operational yet obsolete/functionally deficient for any reason, including: Asset is undersized for its current use (does not meet functional demands/requirements.) Asset does not meet applicable codes and regulations. (Managing Park Assets-API e-course 4/04)

Optional Field – These fields allow you to provide additional information for park use, and for customizing the FMSS to individual park needs (AMP/FMSS Student Manual 1/02)

Parent Relationship – Assets and work-orders have a hierarchical relationship, with Parent having a higher level than the Child. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Planned – Asset status – Asset that is planned or under construction, from initial planning stages until the new asset has been accepted by NPS (at which time the asset becomes operational.) (Managing Park Assets-API e-course 4/04)

Preventive Maintenance Work Order – A work order generated to initiate preventive maintenance on an asset. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Recommended Field – These fields are not indicated on the screen but will link other NPS programs to FMSS and reduce duplicate entries across park unit disciplines. It is highly recommended that these fields be completed to allow for a smooth transition when this interfacing takes place. (AMP/FMSS Student Manual 1/02)

Removed - Asset Status – Asset was once a part of the inventory, but has since been removed by the park. (Managing Park Assets-API e-course 4/04)

Required Field – A field that requires a user-entered value before the record can be posted. A record may contain one or more required fields. (Condition Assessment Incident Command, Validation of Data 03/01)

Serious Deficiency – Exists where: there is a deterioration which if not corrected within 2-5 yrs will result in the failure of the feature; or a threat to the health and/or safety of the user may occur within 2-5 yrs if the deterioration is not corrected; or there is deterioration of adjacent or related materials and/or system as a result of the feature's deficiency. (Condition Assessment Incident Command 03/01)

Specification Template – A data collection template used to document specific information and attributes of assets maintained within the National Park Service. (Condition Assessment Incident Command, Facility Needs Assessment Section 03/01)

Takeoff – A procedure used to select the items needed for a particular estimate and calculate the necessary quantities. (FCAS Student Manual 1/02)

- Assembly Takeoff – A takeoff method that sends a predefined group of items to the spreadsheet in one operation.
- Item Takeoff – A takeoff method that sends individual items to the spreadsheet one-by-one.

Value List - A pre-programmed set of values, attached to a field. The field will only allow the user to enter one of the values contained in the value list. (Condition Assessment Incident Command, Validation of Data 03/01)

Work Activity - A basic element of Facility Management, which describes a specific type of maintenance work that is performed on a park feature, i.e.: patch potholes; open/close trails; pickup litter; replace roof covering; etc. (MMP Computer User Manual)

Work Breakdown Structure (WBS) – A property of items that allows additional information to be attached to each item to organize (sort) the estimate in other sequences and report on items in others. (FCAS Student Manual 1/02)

Work Identification – Process of determining work tasks to be accomplished. Tasks result from a determination that an asset is not at its established standard or a need for a service.

Work Order – Process for documenting work needs and collecting information to aid the work scheduling and assignment process. Information collected should include labor, equipment and material costs, hours, types and quantities.

Work Request - A written or oral request from a customer or internal maintenance person who has observed a deficiency and perceives a need for maintenance or repair work, or who has a request for new work. The work request is evaluated by management and, if approved, converted into a work order for accomplishment. (NASA Facilities Mgmt 10/94)

Work Type – Standard definitions of work tasks which provide a tool enabling facility managers to strengthen planning, execution, and performance measurement at the park level and to gain stewardship credibility

Asset Attributes

Acquisition Cost: The total cost of purchasing an asset, including installation costs.

ADA Compliant: Asset meets the Americans with Disabilities Act (ADA), which gives federal civil rights protections to individuals with disabilities similar to those provided to individuals on the basis of race, color, sex, national origin, age, and religion.

ADA Designated: Asset is identified to meet the Americans with Disabilities Act (ADA), which gives federal civil rights protections to individuals with disabilities similar to those provided to individuals on the basis of race, color, sex, national origin, age, and religion.

Agrees w/Contracted Needs Assessment: Indicates whether the asset was determined to be necessary based on the 1999 contracted needs assessment. “Yes” means the unit was determined to be necessary. “No” indicates the unit was determined not to be necessary and may be excess to the NPS Housing Program. If your park did not have a contracted needs assessment, identify units as determined by the Regional Director, as found in the September 1999 Report to Congress.

Annual Adjusted Average Daily Traffic: Average daily traffic for the term period comprising 80% of annual visitation, or the number of days in that year times 0.8 for the adjustment.

Approximate Ridge Height: The ridge is the horizontal line at the junction of the upper edges of two sloping roof surfaces. The ridge height is the vertical measurement from an individual ridge line to the ground line below.

Archeology Site: Indicates whether or not a known archaeology site lies within the asset.

Asbestos: Either of two incombustible, chemical-resistant, fibrous mineral forms of impure magnesium silicate; used for fireproofing, electrical insulation, building materials, brake linings, and chemical filters.

Asset Damaging Resources: An asset that negatively affects the resources within which it lies.

Asset Ownership: Entity that retains possession of the title (ownership) of the asset.

Avalanche: A large mass of snow and ice that detaches from a mountain slope and suddenly falls or slides downward. Avalanches often follow avalanche paths, or specific locations where avalanches occur.

Barrier Type: An object along the road edge to prevent vehicular traffic from leaving the roadway.

Basement Area: The gross square footage of the basement levels (floors) within the asset.

Basement Levels: The total number of basement levels (floors). (Half-Basement = .5)

Bridge Length: Length of bridge structure, measured from the face of one abutment to the face of the other or from paving notch to paving notch.

Bridge Type: Specifies the type of bridge by category. Possible choices include arch, beam, cable stay, lifting, suspension, and swing bridges.

Bridge Vertical Distance: Measured in linear feet from deck surface to lowest overhead member.

Bridge Width: The widest point from the outside of one barrier/railing/edge to the outside of the other, measured in feet.

Building Type: Identifies the use and purpose of the building through one of 28 different building types.

Campground Type: The type of campground that encompasses the majority of the sites. Possible choices include group, primitive, RV, tent, and tent/RV campgrounds.

Complex Asset, Contract CAC: Asset meets the criteria to be evaluated by professional contractors during the Condition Assessment.

Congressional District: The numeric Congressional District of the Asset. (Districts are notated as "01 – 99". All other designations, i.e. At-Large, Delegate, and Resident Commissioner, are notated as "00").

Construction Type: Primary structural material utilized during construction, including wood, concrete, masonry, metal, or other materials.

Contract/Agreement Reference Number: Reference number for the contract or agreement used with partners or others for use of the asset.

Contract/Agreement Type: A binding agreement between two or more persons that is enforceable by law. Specifies the type of contract or agreement made. Possible choices include concessions contract, cooperative agreement, in-holding, lease/permit, or other type of contract.

Contract Type Comment Field: Field for specific information about the type of contract or agreement that is important to record.

Contractor/Partner Name: The official name of the business, contractor, or other partner involved in the contract or agreement.

County: The county in which the majority of the asset resides.

Cultural Landscape Inventory Number: The numeric indicator used by the Cultural Landscape Inventory.

Curatorial Item(s) Associated: Indicates whether there are curatorial items in the museum collection from this asset.

Date Acquired: Month, day, and year asset was acquired, listed as MMDDYYYY. If month and day are not available, a year must be listed at the minimum.

Date Last Renovated: The last date the asset received any sort of renovation.

Design Load: The number of tons the bridge is design for supporting.

Design Speed: The highest continuous speed at which individual vehicles can travel with safety upon a highway or road when weather conditions are good and traffic density is low. The geometric design features of the highway are the governing conditions for safe speed.

Discharge Type: The type of discharge from the waste water system identified through a value list.

Discharge Permit: Approval from the jurisdiction to dispose of the waste in the water stream.

Disinfectant: An item used to cleanse an asset or feature of harmful microorganisms. Possible choices include chlorine/S02 gas, liquid chlorine, ultra violet w/chlorine gas, ultra violet w/liquid chlorine, or other.

DOI Code: DOI codes were developed by a multi-bureau workgroup to facilitate the identification and definition for assets managed by the Department of Interior.

Electricity: Specifies whether electricity is available and, if so, what type of electricity.

Electrical System Type: Type of electrical generating system. Possible choices include fossil fuel, solar generation, wind generation, hydro generation, and public utilities.

Energy: Type of energy source. Possible choices include geothermal, fossil fuel, hybrid, hydroelectric, photo voltaic, thermoelectric, and wind turbine.

Facility Maintenance Responsibility: The entity responsible for performing the maintenance required on an asset.

Facility Operation Responsible: The agency that performs activities related to the assets normal performance. The costs of utilities, janitorial services, window cleaning, rodent and pest control, waste management, etc.

FASAB Classification: Federal Accounting Standards Advisory Board. Categorization of separating the heritage assets according to FASAB—General, Stewardship.

Fire sprinkler: An integrated system of underground and overhead piping designed in accordance with fire protection engineering standards.

Flood Plain: A nearly flat plain along the course of a stream that is naturally subject to flooding.

Foot Print Area: The gross square footage of the foundation (Foot Print Area).

Functional Classification: FHWA general park road classification. Determined by the roads main function.

Federal Highway Number: The FHWA designated route number.

Generation Plant: Indicates whether or not electricity is generated locally.

Gross Acreage: The acreage occupied by asset.

Gross Square Footage: The sum of floor areas within the outside faces of the exterior walls for all building levels which have floor spaces. Covered walkways, open roofed-over areas that are paved, porches, and similar spaces shall have the architectural area multiplied by an area factor of 0.50.

GSA Code: The GSA Property codes are divided into Land, Building, and Structures / Facilities. Each GSA property code has a definition. If you cannot find a GSA code that is equivalent to an NPS asset code, use the number from the GSA property that is closest in definition.

Historic: Indicates whether or not the asset is over 50 years old.

Housing Type: Categorization of housing types by primary function. . Possible choices include multi-unit, single family, support building, and trailer.

Hurricane: A violent, tropical, cyclonic storm of the western North Atlantic, having winds of or in excess of 74 MPH.

Latitude: The angular distance between north or south from the Equator of a point on the Earth's surface measured on the meridian of the point.

LCS Classified Structure Number: LCS is the List of Classified Structures (inventory) that assigns an identification number to all historic and prehistoric structures.

Lead Paint: Paint containing the hazardous material of lead.

Longitude: The angular distance east or west on the Earth's surface, measured by the angle contained between the meridian of a particular place and the Prime Meridian in Greenwich, England.

National Historic Landmark: Asset is designated as a National Historic Landmark.

National Natural Landmark: Asset is designated as a National Natural Landmark. The only natural areas program of national scope that identifies and recognizes the best examples of both biological and geological features in both public and private ownership.

NFPA Occupant Load: NFPA stands for National Fire Protection Association. The Occupant Load is the total number of persons that shall be permitted to occupy a building or portion thereof at any one time.

NFPA Construction Type: The combination of materials used in the construction of a building or structure, based on the varying degrees of fire resistance and combustibility according to the National Fire Protection Association.

NPS Employee Housing Program: Distinguishes whether a housing unit belongs to the NPS Housing Program of other housing units within a park.

Number of Floors: The total number of floors (levels) in an asset, excluding the basement levels.

Number of Foot Bridges: Number of minor trail bridges, listed as features of the trail.

Occupancy Classification: The category of occupancy according to the Uniform Building Code (UBC).

Occupant/Assigned To: Agency that occupies or is assigned to use the asset.

Operates Seasonally: Indicates whether the asset operates on a seasonal basis. "Yes" means seasonal use, and "No" means year-round use.

Park Alpha Code: The four-digit alpha code for your park.

Park Assigned Name: The name of the asset referred to by the park if different from the FMSS description.

Park Assigned Number: The asset identification number assigned to an asset when constructed or acquired.

Pavement Condition Rating: Numerical rating from 0 (fails) to 100 (excels), based on surface condition and roughness of road.

Phases - Number: The generation of alternating currents (AC). AC is an electrical current, where electrical charge oscillates (i.e., moves back and forth), rather than flowing continuously in one direction as is the case with direct current. The desired waveform of the oscillation is generally that of a perfect sine wave, as this results in the most efficient transmission of energy.

Plant Generation Capacity: The total amount of electricity able to be generated by a plant, measured in kilowatts.

Plant Generation Capacity Volts: The total amount of electricity able to be generated by a plant, measured volts.

Plant Rated Production Capacity: The total production possible for a plant, rated in million gallons per day, or (MGD).

Potable Water: Indicates whether water is suitable for drinking.

Primary Use: Identifies the primary use of the asset, whether it is administrative or public use.

Radon: Radioactive gaseous element produced by the decay of radium.

Road Type (Primary Surface): Categorization of road assets by surface type. Possible choices are paved or unpaved roads.

Seismic Zone: Movement caused by an earthquake. Related to structural adequacy, there are six seismic zones within the Uniform Building Code: 0, 1, 2A, 2B, 3, and 4. Zone 0 represents minimum seismic risk with higher numbers representing increasing risk up to Zone 4, the maximum seismic risk zone. Zone 2 is subdivided into two zones, 2A and 2B.

Setting/Area: Identifies what setting this asset is surrounded by (frontcountry, backcountry, or urban).

Source: The source of water, or from where water is taken for park use. Possible water sources include spring water, surface water, well water, municipal water/non-NPS system, or other.

State/Territory: The official two-character abbreviation of the State.

Storage Capacity: The total number of gallons of water that can be stored in a system.

System Capacity: The amount of water that can be processed in gallons per day.

Threatened and Endangered Species: Species that are classified through the Endangered Species Act as endangered or threatened of becoming extinct.

Trail Tread Type: The major type of material used to make the trail surface.

Trail Function Class: Class of trail that describes its primary use and location.

Trail Average Grade: Trail grade indicates the steepness, or slope, of a trail. It is measured in percentages, found by dividing the vertical rise over the horizontal run of the trail. The higher the percentage, the steeper the trail.

Trail Length: Length of entire trail in linear feet.

Trail Designed Use: The purpose and intended users of a trail. Possible choices include bicycle, hiker, horse, and snow use.

Trail Width: Specifies the design width of the trail in feet. This will vary over the length of the trail. Give a typical or reasonable width.

Transmission Line Length: The total distance from one end of the transmission lines to the other, measured in feet.

Tsunami: Unusually large wave produced by a seaquake or undersea volcanic eruption.

Wastewater System Type: Describes where wastewater is treated, either on-site or off-site.

Water System Type: Specifies whether water is potable or non-potable. Potable water is suitable for drinking or cooking purposes from both health and aesthetic considerations.

Wilderness: Land and water where natural ecological processes operate as freely of human influence as possible and with primitive recreation opportunities and solitude.

Wildland Fire: Any non-structural fire that occurs on wild land.

Year Built: The year the asset was constructed (YYYY).

Equipment Attributes

Abutment: The outermost end supports on a bridge, which carry the load from the deck of a span, bridge, or arch. Abutments are usually constructed of stone, concrete, brick, or timber.

Acquisition Cost: The total cost of purchasing a piece of equipment, including installation costs.

Acquisition Date: Month, day, and year asset was acquired, listed as MMDDYYYY. If month and day are not available, a year must be listed at the minimum.

Air Compressor Horsepower: The measurement of the power capability of the compressor. Dependent on the volume and pressure capabilities.

Air Compressor PSI: PSI is the pounds per square inch that the compressor is capable of producing. Refers to the pressure of the air produced by the compressor.

AC Package Unit Cooled: A direct expansion air conditioner that provides cooling in which the condenser, compressor, and evaporator are contained in a single unit.

AC Package Unit Heat: A direct expansion air conditioner that provides heating in which the condenser, compressor, and evaporator are contained in a single unit.

AC Package Unit Tonnage : The unit of measure used in air conditioning to describe the cooling capacity of a system. One ton represents the amount of heat absorbed to melt one ton (2000 lbs.) of ice in one hour. 12,000 Btu/hr equals one ton of cooling.

Air Handling Unit (AHU) Cooling Coils: Heat exchanger in an Air Handler that draws heat out of the air as it flows through it. Can use direct expansion refrigerant or chill water as the heat sink.

AHU Heating Coils: Located in the furnace, heating coils transfer heat to the surrounding air, which is then pumped throughout the facility. AHU heating coils use hot water, steam, or electrical elements as a heat source.

AHU Heat System Type: The type of heat exchanger and air handler unit.

AHU Tonnage: The unit of measure used in air conditioning to describe the cooling capacity of a system. One ton represents the amount of heat absorbed to melt one ton (2000 lbs.) of ice in one hour. 12,000 Btu/hr equals one ton of cooling.

Backflow Preventer: A device that prevents wastewater and other contaminants from flowing into the potable water supply.

Backflow Preventer Size: Diameter of the water supply line size that the backflow preventer services.

Backrest: A support that you can lean against while sitting.

Bench Length: Horizontal outermost distance between the extreme ends of the bench measured in feet.

Bench Base Material: Material of which the base of the bench is constructed.

Bench Seat Material: Material of which the bench seat is constructed.

Bench Remoteness: See Remoteness.

Bitumen: A mixture of hydrocarbons and other substances that are used in asphalt or tar and can be used to surface roads or to provide waterproofing.

Bridge Railing and Parapet: A low wall or structure placed to protect any spot where there is a sudden drop at the edge of a bridge.

Bridge Surface Type: The material that is used as the topmost traveling surface of the bridge. Possible choices include timber, concrete, steel, or other material.

Building Type: Identifies the use of the building.

Boiler Fuel Type: Category of boiler associated with the type of fuel used.

Boiler MBH Rating: The heating capacity of a boiler; expressed in MBH, Btu per hour (Btu/h), horsepower, or pounds of steam per hour.

Boiler Style: The medium used by the boiler to transfer heat to the serviced components. Possible choices include steam or hot water.

Boiler Type: The design category of the boiler.

Chiller Cooled Type: The medium used as a heat sink for the chiller condenser.

Chiller Tonnage: The unit of measure used to describe the cooling capacity of a system. One ton represents the amount of heat absorbed to melt one ton (2000 lbs.) of ice in one hour. 12,000 Btu/hr equals one ton of cooling.

Chiller Type: The mechanical design category of the chiller.

Comment: A place to enter a known park reference to an asset or equipment/feature

Composting System: Composting toilet facility that is not connected to a municipal sewer system but uses the natural decomposition methods.

CO detector: Carbon Monoxide is an odorless, tasteless, invisible gas. A CO Detector is an alarm with a preset level to indicate when carbon monoxide levels have exceeded safe levels.

Condenser Unit Cool Type: The heat sink medium for a condenser. Possible choices include air- or water-cooled units.

Condenser Unit Tonnage: Cooling capacity of the condenser. One ton of heat represents the amount of heat needed to melt one ton (2000 lbs.) of ice in one hour. 12,000 Btu/hr equals one ton of heat.

Contract Needs Assess Eligible: Is this housing unit consistent with the 1999 contracted housing needs assessment? In many parks, contractors identified excess assets but did not specify which housing units were considered excess and which were necessary. Parks are now directed to indicate if this housing unit (asset) was determined to be necessary based on the 1999 contracted needs assessment.

Cooling Tower Tonnage: Cooling capacity of the cooling tower. One ton of heat represents the amount of heat needed to melt one ton (2000 lbs.) of ice in one hour (12,000 Btu/hr equals one ton of heat).

Culvert Diameter: The size designation measuring the clear inside diameter of the culvert in inches.

Culvert Length: The axial length of the culvert. Horizontal outermost distance between the extreme ends of the culvert measured in linear feet.

Culvert Material: The predominant material of which the culvert is constructed. Possible choices include galvanized steel, reinforced concrete, native stone, plastic, or other material.

Culvert Type: The main purpose for the construction of the culvert. Possible choices include stream crossing or cross drainage.

Deck Length: The distance of the bridge deck structure measured from the face of one abutment to the face of the other or from paving notch to paving notch.

Design Load: The bridge load is the maximum allowable load (the total gross weight in pounds) that can legally be imposed on the bridge by any group of two or more consecutive axles on a vehicle or combination of vehicles. If a vehicle conforms to the bridge formula then it will not cause bridge structure stresses, strains or deflections to exceed those critical values calculated using the standard HS20-44 design vehicle.

Deck Width: The width of the bridge decking or surface, or the widest point from the outside of one barrier/railing/edge to the outside of the other.

Description Comment: Field for specific information about the equipment description that is important to record.

Dorm Rooms: Number of dorm rooms that may house tenants.

Drainage: A system designed to remove water from the bridge structure.

Drainage Structure Length: The distance from one end of the drainage system to the other, measured in feet.

Drainage Structure Material: Material that is used to construct the water bars and retainer bars.

Drainage Structure Style: A diagonal ditch or hump in a trail that diverts surface water runoff to minimize soil erosion. A shallow trench cut into the surface or created by an embankment (e.g., log and soil), to collect and channel water off the surface, to avoid erosion

Elevator Number of Floors: The number of floors that the elevator services.

Elevator Type: The type of elevator defined by the mechanism used to lift the car.

Elevator Use: Specifies the main design object and use for the elevator. Possible choices include passenger or freight.

Elevator Weight Capacity: The maximum weight that the elevator is designed to safely lift. This should be predominantly displayed in the cab.

Estimated Remaining Life: An educated estimate of the number of years until the equipment will need to be replaced. This is based on published data tables coupled with specific field information.

Exterior Door Core: Specifies if the main core of the door is solid or hollow.

Exterior Door Frame Material: The predominant type of material used to construct the exterior door frame.

Exterior Door Material: The predominant type of material used to construct the door.

Exterior Door Height: The height of an exterior door measured from base to top in inches.

Exterior Door Single or Double: Specifies whether the exterior door has a single hinge or a double hinge. Generally, a three-foot door is a single door, and a 6-foot door is a double door.

Exterior Door Painted: Specifies whether the exterior door is painted.

Exterior Door Type: The design and application of the exterior door.

Exterior Door Width: Perpendicular distance measured from one vertical edge of the exterior door to the opposite vertical edge, measured in inches.

Exterior Wall Finish: The material used in the topmost, protective layer of exterior walls, or the material used to provide a decorative or architectural texture, material, or appearance. Examples include paints and stains.

Exterior Wall Material: The actual exposed wall material. This includes brick, wood, siding, and others.

Fence Height: Distance from the ground level to the topmost point of the structure.

Fence Material: Specifies the predominant material that is used in the construction of the fence. Possible fence material choices include metal, wood, concrete, PVC, or other materials.

Fence Post (Material): Specifies the main material used to construct the fence post. Possible fence post material choices include metal, wood, concrete, PVC, rock, or other material types.

Fence Remoteness: See Remoteness.

Fence Security Wire: The type of wire that is used on an existing fence or as the base barrier used to provide added security for the property.

Fence Style: Specifies both the material and method of the fence construction. Possible fence type choices include chain link, stockade, picket, privacy, open rail, or other.

Fire Alarm System Coverage Area: The area within the jurisdiction of the alarm system. If a fire started in this area, the alarm would be triggered.

Fire Extinguishing System Coverage Area: The area within the fire extinguishing system jurisdiction. If a fire started in this area, the extinguishing medium would be applied to it in an effort to put it out.

Fire Extinguishing System Type: The type of activated fire control system in a structure defined by the extinguishing material and the method of dispersion.

Fire Ring Diameter: The diameter of the structure used to provide a protective border around a campfire, measured in inches.

Fire Ring Material: The material used to construct a physical barrier, usually a circle, around a campfire to provide a protective border and reduce the spread of the campfire to the surrounding areas. The main fire ring material is usually metal.

Food Locker Height: Height or depth of the food locker compartment measured from top to bottom in inches.

Food Locker Length: Horizontal outermost distance between the ends of the food locker measured in feet.

Food Locker Material: The predominant material that is used in the construction of the food locker.

Functional Classification—Federal Highway Administration (FHWA): Federal Highway Administration (FHWA) general park road classification. Determined by the road's main function and location.

Furnace BTU/HR: The heating capacity of a furnace in BTUs per hour, or the amount of gross BTUs the furnace can add to the air that passes through it in one hour.

Furnace—Cooling Coils: System of coils or tubes in an air conditioning unit that receives the high-pressure refrigerant and allows it to expand, causing the refrigerant to absorb heat. It can also use chilled water as a heat sink.

Furnace—Type Heat: Space-heating equipment consisting of an enclosed chamber where fuel is burned or electrical resistance is used to heat air directly, without using steam or hot water. The warm air is for heating and is distributed throughout the house, typically by air ducts. The type is to be defined by the heat energy source or fuel.

Garage One-Car: Number of one-car garages.

Garage Two-Car: Number of two-car garages.

Gate Remoteness: See Remoteness.

Gate Height: Height of gate structure from ground to the topmost point measured in feet.

Gate Length: Horizontal outermost distance between the ends of the gate measured in feet.

Gate Automated Opener: Mechanism that operates the gate door by remote or switch. This specifies whether the gate includes equipment that operates the door by remote or switch.

Gate Style: The predominant design of the gate, categorized by material and construction terms.

Gate Security Wire: Wire with sharp protrusions usually located on the top portion of the gate used to keep people from climbing over the structure.

Gate Material: The predominant material of which the gate is made. Possible gate material choices include metal, wood, concrete, PVC, rock, or other materials.

Generator Fuel Type: The main source of energy used by the generator.

Generator KVA Rating: The capacity of the generator measured in thousand volt-ampere (Kilovolt-Amp). An electrical power-rating product of voltage and current. Dividing that product by the line voltage yields the output current rating of the power source. When multiplied by the power factor, will give kilowatts, or KW.

Generator KW Rating: Kilowatt, or 1000 Watts, a unit of power representing the rate at which energy is used or produced. The product of voltage and current.

Generator PF Rating: The ratio of actual power being used in a circuit, expressed in watts or kilowatts (KW), to the power which is apparently being drawn from the line, expressed in volt-amperes or kilovolt amperes. Power factor values range from 0 to 1.0, where the optimum

value of 1.0 indicates that no power is being lost due to the reactive properties of the equipment

Generator Phase: The time relationship between two AC (alternating current) signals.

Generator Voltage: A measure of electrical potential of the generator. Specifies the voltage at which the generator is capable of operating.

GPS End Latitude: Point at end of a trail or road that is measured by the angular distance north or south of the Equator as determined by a global positioning system. It is measured in degrees, minutes, and seconds.

GPS End Longitude: Point at end of a trail or road that is measured by the angular distance east and west from the Prime Meridian as determined by the GPS systems and measured in degrees, minutes, and seconds. The meridian is an imaginary north-south line through Greenwich, England.

GPS Start Latitude: Point at start of trail or road that is measured by the angular distance north or south of the Equator as determined by a global positioning system. It is measured in degrees, minutes, and seconds.

GPS Start Longitude: Point at start of trail or road that is measured by the angular distance east and west from the Prime Meridian as determined by the GPS systems and measured in degrees, minutes, and seconds. The meridian is an imaginary north-south line through Greenwich, England.

Guard Approach Treatment: The construction of the end of a guard that is facing oncoming traffic.

Guard End Treatment: The construction of the ends of the guard.

Guard Road Orientation: The location of the guard relative to the driver's view point.

Guard Barrier Type: The predominant material of which the guard barrier is constructed. Possible guard barrier materials include metal, steel, concrete, cable, stone, or wood.

Housing Type: Categorization of housing types by primary function.

Housing Accessibility: Whether the unit is fully accessible, readily adaptable, or not accessible according to the Americans with Disabilities Act (ADA) standards.

Lead Paint: Paint containing the hazardous material of lead.

Non-Livable Quarters: Housing that is in disrepair and is not fit for human habitation.

Official Use Space Basement: Number of square feet of official use space in the basement designated for business use only and unsuitable for family living purposes.

Official Use Space First Floor: Number of square feet of official use space on the first floor designated for business use only and unsuitable for family living purposes.

Official Use Space Other Floors: Number of square feet of official use space on other floors designated for business use only and unsuitable for family living purposes.

Outbuilding Type: The type and purpose of the outbuilding.

Outbuilding Foot Print: The overall area covered by the foundation of the outbuilding measured in square feet; the gross square footage of the foundation.

Outbuilding Material: The predominant material out of which the outbuilding is constructed.

Outbuilding Electricity: Specifies whether or not the outbuilding is powered by electricity.

Park Alpha Code: The four-digit alphabetic code for your park, written in all capital letters.

Picnic Table Length: Horizontal outermost distance between the ends of the picnic table measured in feet.

Picnic Table Base Material: The predominant material of which the picnic table base structure is constructed. Possible material choices include metal, wood, concrete, masonry/stone, or other materials.

Picnic Table Surface Material: The predominant material of which the picnic table surface is constructed. Possible material choices include metal, wood, concrete, masonry/stone, or other materials.

Piles: A column of wood or steel or concrete that is driven into the ground to provide support for a structure.

Pump Horsepower: The work done per unit of time. One horsepower equals 33,000 foot-pounds of work per minute or approximately 746 watts. Motors for pumps are rated in horsepower.

Pump Types: Pumps categorized by design, physical components and pumping mechanisms.

Pump Volume/Capacity: The gallons per minute that can be transferred through a pump head against a specific resistance.

QMIS Reference No.: Quarters Management Information System program. Provided by the National Business Center.

Quantity: The number of distinct components that can be associated with a specific piece of equipment and unit of measure.

Raised Trail Length: The distance from the beginning of the raised trail to the end, measured in linear feet.

Raised Trail Remoteness: See Remoteness.

Raised Trail Type: The category of the raised trail defined by common acceptable construction terms.

Raised Trail Width: Perpendicular distance, measured from the finished usable edge of the trail to the opposite finished edge.

Remoteness: Remoteness is a function of the accessibility of the equipment. It specifies relative distance from developed areas. Possible remoteness classifications include high, medium, or low remoteness as defined by the NPS.

Road Length: Length of road in miles.

Roof Ballast: Coarse gravel laid to form a bed to protect the roof from damage.

Roof Material Type: The predominant material out of which the roof is constructed.

Shoulder Width: Perpendicular distance measured from the finished usable edge of the shoulder to the opposite finished usable edge.

Sign Height: Distance from the ground level to the topmost point of the structure.

Sign Length: Horizontal outermost distance between the ends of the sign measured in feet.

Sign Material: The predominant material out of which the sign is constructed.

Smoke Detector: Number of smoke detectors present.

Superstructure: The entire portion of a bridge structure which primarily receives and supports traffic loads and in turn transfers these loads to the bridge substructure.

Surface Design Speed: The average speed for which the surface was designed.

Surface Type: The material out of which the topmost layer on a road is constructed.

Tent Pad Base Material: The predominant material that is used to construct the tent pad base.

Tent Pad Length: Distance between the extreme ends of the tent pad measured in linear feet.

Tent Pad Width: Perpendicular distance from length, measured from the finished usable edge of the tent pad to the opposite finished usable edge.

Trail Remoteness: See Remoteness.

Trail Segment Length: Length of the trail segment from beginning to end measured in miles.

Tread Functional Class: Categories of tread development based on the level and complexity of the construction.

Tread Type: The predominant material making up the surface of a trail or walk. This is material that is placed on top of the base layer to provide the walking or driving surface. Some options include pavement, gravel, and native materials (including many different sizes of rock).

Typical Road Width: Perpendicular distance measured from the finished usable edge of the road to the opposite finished usable edge.

Typical Trail Segment Grade: The average gradient, or steepness, of a slope of trail segment. This is measured by dividing the rise, or increase, of the trail by the run, or length, and is reported as a percentage.

Typical Trail Segment Width: Perpendicular distance measured from the finished usable edge of the trail segment to the opposite finished usable edge.

UPS Battery: The energy storage device that is used in an uninterruptible power system. Larger systems use arrays or banks of batteries in parallel. The batteries are usually chemical cells that produce an electric current from a chemical reaction.

UPS System KVA Rating: The capacity of the UPS System measured in thousand volt-ampere (Kilovolt-Amp). An electrical power-rating product of voltage and current. Dividing that product by the line voltage yields the output current rating of the power source. When multiplied by the power factor, will give kilowatts, or KW.

Valve Operation Mechanism: Specifies how the valve shaft is moved or rotated to open and close the port. Valve operation mechanism is determined by automatic or manual means.

Valve Type: The style of the valve equipment. Possible choices include butterfly, ball, check, cock, diaphragm, gate, globe, plug, pinch, flap, needle, pressure relief, or other valve types.

Valve Size (diameter): The diameter of the valve, measured across the inside of the valve in inches and usually indicates the pipe connection size.

Wall Material: The predominant material that is used in the construction of the wall, retaining/crib wall. (Refer to the definition of crib wall).

Wall Length: Horizontal outermost distance between the extreme ends of the wall measured in linear feet.

Wall Style: The predominant design and construction method of the wall. Possible wall style choices include gravity, cantilever, counterfort, mechanically stabilized, earth, interlocking block, tie back, or other styles.

Wall Remoteness: See Remoteness.

Window Height: The height of the window in inches measured from the lowermost to uppermost inside of the window.

Window Material: The predominant material out of which the window frame is constructed.

Window Operating: Specifies whether the window is fixed in one spot or operational and able to be opened.

Window Insulated Glass: Indicates whether the window is made of insulated glass or not.

Window Type: Categorizes the window style based on design characteristics. Possible choices include casement or double hung windows.

Window Width: The distance from one vertical edge of the window to the other, measured in inches.

ACRONYMS

AL	Alteration
AMP	Asset Management Process
API	Asset Priority Index
AWP	Annual Work Plan
BMAR	Backlog of Maintenance and Repair
CESS	Cost Estimating Software System
CI	Capital Improvement
CLI	Cultural Landscape Inventory
CM	Corrective Maintenance
CR	Component Renewal
CR-DM	Component Renewal Deferred Maintenance
CRV	Current Replacement Value
DM	Deferred Maintenance
EM	Emergency Maintenance
FCAS	Facility Condition Assessment Survey
FCI	Facility Condition Index
FM	Facilities Maintenance
FMP	Facility Management Program

FMSS	Facility Management Software System
FO	Facilities Operations
GAO	Government Accounting Office
GFE	Government Furnished Equipment
GPRA	Government Performance and Results Act
ICAP	Inventory Condition Assessment Program (replaced by FCAS)
INAC	Inspection, Accessibility
INCAA	Inspection, Condition Assessment, Annual
INCAC	Inspection, Condition Assessment, Comprehensive
INFLSA	Inspection, Fire and Life Safety, Annual
INFPCA	Inspection, Fire Protection Condition Assessment
INOTH	Other types of Inspections
IPH	Immediate Personal Hazard
ISO	International Standards Organization
LMAC	Legislatively Mandated, Accessibility
LMFS	Legislatively Mandated, Fire/Structure
LMLS	Legislatively Mandated, Life/Safety Code
LMCO	Legislatively Mandated, Code Compliance-other
LI	Line Item
LCC	Life-cycle Costs
LCS	List of Classified Structures
LM	Legislatively Mandated
M&R	Maintenance and Repair
NC	New Construction
OFS	Operating Formulation System
OMB	Office of Management and Budget
PM	Preventive Maintenance
PMIS	Project Management Information System
PP&E	Property, Plant and Equipment
RDO	Regional Director's Office
RM	Recurring Maintenance
RM-DM	Recurring Maintenance Deferred Maintenance
ROI	Return on Investment
R&R (RERE)	Repair Rehabilitation
SMAC	Servicewide Maintenance Advisory Council
SSO	System Support Office
WBS	Work Breakdown Structure
WTF	Water Treatment Facility
WWTF	Wastewater Treatment Facility

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